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Vol. 155, No. 5

February 1, 1945

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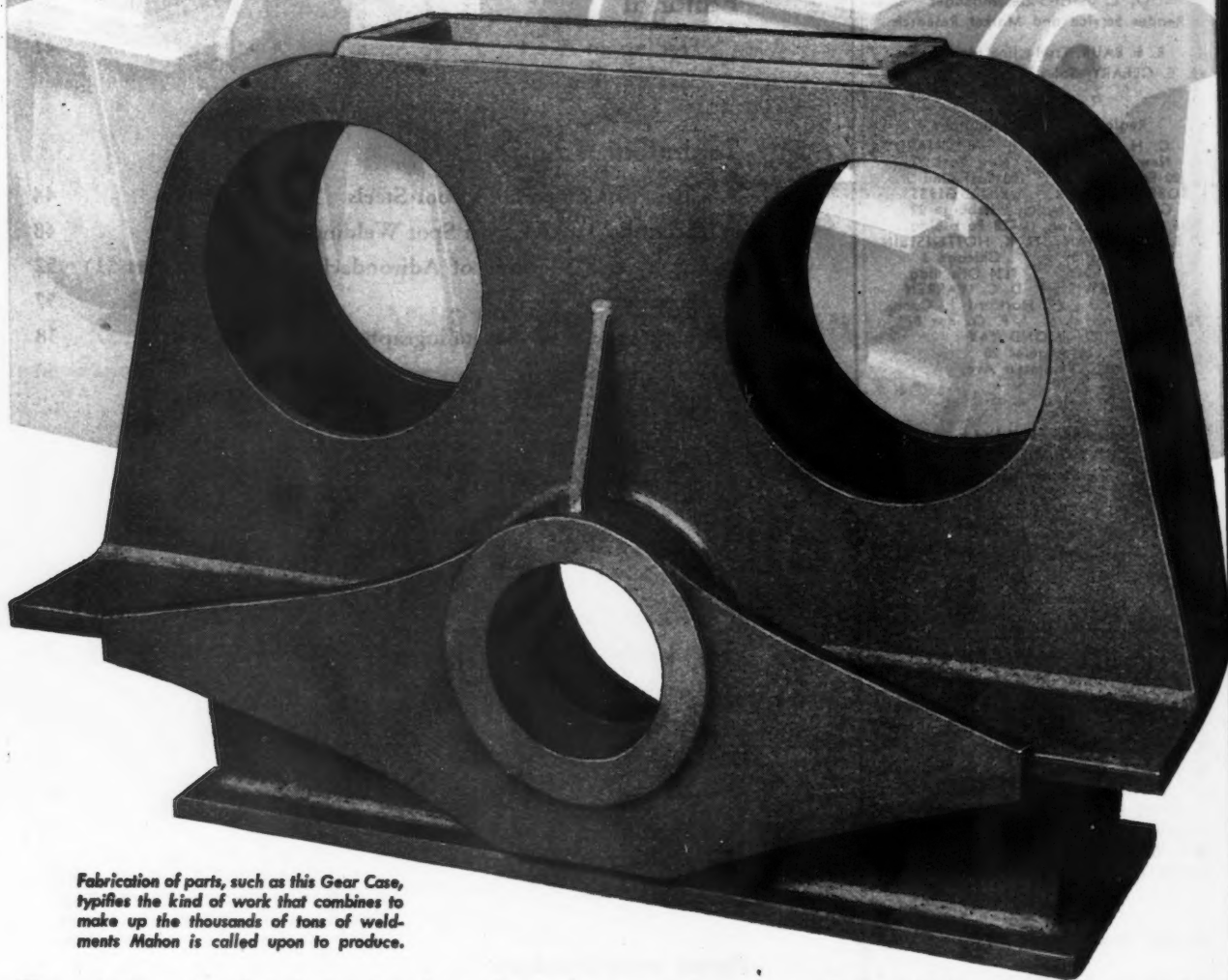
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Mahon Fabricated **WELDMENTS**



Fabrication of parts, such as this Gear Case, typifies the kind of work that combines to make up the thousands of tons of weldments Mahon is called upon to produce.

The attention of all industry has been focused on **WELDED STEEL PLATE CONSTRUCTION** in the fabrication of implements of war—a condition that is certain to carry over into the manufacture of peacetime parts and products.

The advantages are manifold. **WELDED STEEL PLATE** is stronger and lighter. It requires less machining and finishing. It eliminates pattern expense and reduces scrap. It is non-porous. It presents a smoother, finer,

appearance and, in nearly all instances, parts and products can be produced in quicker time—at a very attractive cost.

Supplementing the extensive production facilities available at Mahon is a staff of experienced design engineers. These men are prepared to give you exact and complete information in adapting your product to the advantages of **WELDED STEEL PLATE CONSTRUCTION**. They will also assist you in its re-design if that should be required.

THE R. C. MAHON COMPANY
DETROIT II CHICAGO 4

Fabricators of Machine Bases and Frames and Many Other Welded Steel Plate Products

The IRON AGE

ESTABLISHED 1885

Feb. 1, 1945

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Trading an Ace for a Two Spot

THERE is a very human and natural state of mind that we call "hero worship." It has come down to us through the ages as a psychological reaction to the average man's acknowledged need for leadership.

Thus it is quite normal and perhaps altogether good to consider that the man who is elected to the presidency of our country is because of Divine Providence possessed of those great impartial qualities that will cause him to act, in matters of state, without regard to any considerations whatever other than those in the best interests of the public at large.

It must, therefore, be disillusioning to many, many millions of us to learn, as we have so recently, that our beliefs in this respect are not merely illusions but delusions. No Tammany chieftain could act with more crass and utter disregard in rewarding a ward heeler for votes delivered than has the President of the United States in kicking Jesse Jones out of office to make place for Henry Wallace.

This is no reflection on the Honorable Mr. Wallace, who so far as we know, has been forthright in expressing his views and has never carried water on both shoulders. He does not like business and has said so. He doesn't admire the profit system and has said so. He likes the most radical elements in our labor empire and has said so. Every man is entitled to his opinions and his likes and dislikes.

Jesse Jones is a Democrat. Like the vanishing Indians, he perhaps is one of the last of that tribe. As such he is respected and admired as much by Republicans as he is by those who voted the opposite ticket. Jones knows his business because he is a business man. He built up his own business and did not inherit one that he was incapable of running. He is a man to whom the average American can entrust his bank account and pocket book, knowing that the money will be regarded as a sacred trust and not shoveled down the sewer. The crime for which he was beheaded was that for 13 years he played square with the great funds entrusted to him.

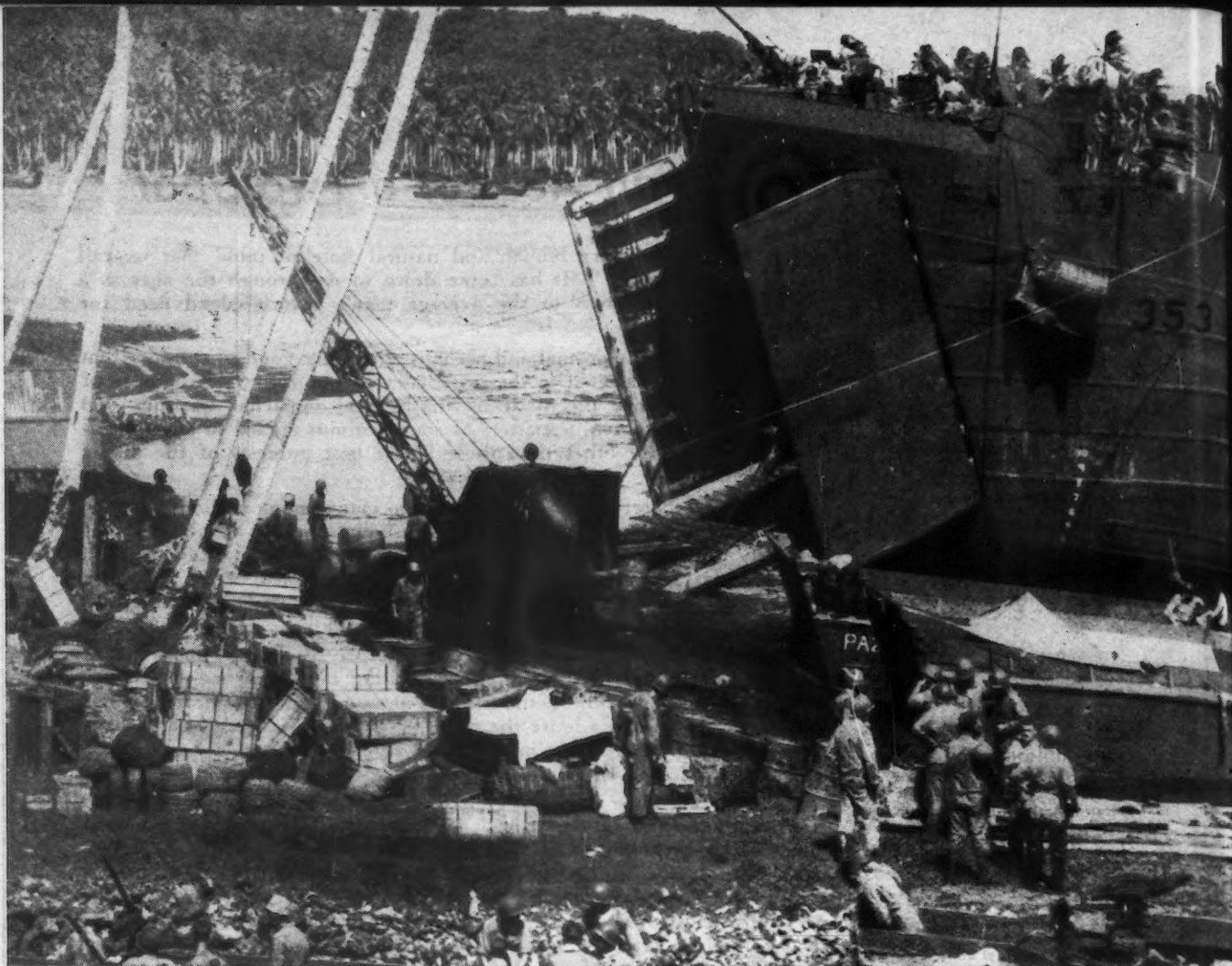
Forty billion is indeed a great sum of money. It is enough to make or break the future of every man and woman in America.

The ordinary office of Secretary of Commerce is one that under proper supervision has been useful to American business. But business can take it or leave it and with Mr. Wallace at the head of it the latter is what it will undoubtedly do, for the average American businessman takes no truck in crystal-ball gazing or astrology in formulating his plans. He is willing to leave that to a Rasputin or to the astrological expert who acts as consultant to Hitler. So far as business and industry are concerned, the title of Secretary of Commerce does not "cut much ice" but the control of 40 billion dollars of taxpayers' money does.

Edgar Bergen very wisely restricts his Charley McCarthy to an expenditure of 75 cents a week, knowing his qualifications and peculiarities. It is indeed difficult to conceive of a Charley McCarthy sitting on the lap of Sidney Hillman with practically unlimited funds to scatter to his friends. That would be something!

No doubt Henry Agard deserves something for his allegiance to the New Deal and for so graciously accepting a turn down for the vice-presidency. But the control of 40 billion dollars is too big to be commensurate with services rendered to any party. And indeed, that would be a minor part of the cost. The major part would be a complete disillusionment in the integrity of the present administration.

John Van Deventer



Official U. S. Navy Photograph courtesy Bay City Shovels, Inc.

Inland Steel in the South Seas

Go anywhere among America's fighting men in the South Seas and you will find steel from Inland—sometimes working for Victory at a permanent base—at other times plowing the South Seas, carrying men and supplies in many types of fighting, carrier, and landing vessels.

In the picture shown above an LST, with bow doors swung wide, is emitting a flow of vital supplies for Rendova Island in the central Solomons.

Aiding in this work is a crawl-

ler-type crane. In the foreground are personnel landing craft. Thousands upon thousands of tons of Inland plates, sheets, and structural shapes have gone into building cranes and craft of these types.

Today, as every day since the attack at Pearl Harbor, Inland mills and Inland men are engaged full time making steel for America at war.

Bars • Floor Plate • Piling • Plates • Rail
Reinforcing Bars • Sheets • Strip • Structurals
Tin Plate • Track Accessories



INLAND STEEL COMPANY

38 S. Dearborn St., Chicago 3, Illinois

Sales Offices: Cincinnati • Detroit • Kansas City • Milwaukee • New York • St. Louis • St. Paul

NEWS FRONT

The future possibilities of large-scale steel production on the West Coast continue to be a major behind-the-scenes topic of conversation.

Geneva and/or Fontana are so bogged down by a welter of conflicting data that C, which has a great stake in both, has Arthur G. McKee & Co. making a new survey on Fontana and Freyn Engineering Co. making a similar survey on Geneva. The Kaiser Co. has Brassert making a duplicate survey of its own situation.

These reports will cover raw materials, plant facilities, freight rates, market possibilities, etc., and will be completed in four to six months. Whether the confused situation will be clarified is doubtful.

Meanwhile: Fortune magazine will soon be out with an elaborate pronouncement of its own, with the conclusion that Fontana was built more quickly and efficiently whereas Geneva has a better basic setup. This conclusion apparently justifies no one.

American Bridge Co. will likely make earth-moving equipment after the war, with Caterpillar Tractor Co. distributing the equipment. Caterpillar has dissolved its distributorship with LeTourneau. Possibly the American Car & Foundry Co. will assemble tractors for the Caterpillar-American Bridge combination.

Shipbuilding on the West Coast is being curtailed, preference being given to repair work. Bethlehem yards will add, and in fact, are now adding additional facilities to handle this repair work.

Periodic renegotiation of contracts and the closer pricing policy of the Navy department have effected price reductions that are obtaining 25 per cent more war supplies for each dollar expended than was obtained early in 1942.

For example: The Navy is now paying about one million dollars less per destroyer than it did at the beginning of 1942; the price of one type of landing craft has been reduced from \$21,000 to \$17,000; the price of one type of fighter plane has been reduced from a starting price of \$66,000 to a volume production price of \$32,000 and one type of bomber plane from \$118,000 to \$58,000.

Industrialization of the South American Republics will result in heavy purchases of railroad equipment in this country, C. E. Kraehn, assistant to the vice-president of Baldwin Locomotive Works, predicts after surveying present and postwar equipment needs on the spot.

The need for locomotives is described as acute although the largest potential market, Argentina, will get no aid.

Enlarged major ammunition programs have increased requirements for screw machine products by 80 per cent over the demand existing in January of last year.

Fifty-eight thousand American made lend-lease machine tools, together with attachments and spare parts have been sold the United Kingdom for \$31,500,000 or not quite 19 per cent of the original cost of \$166,000,000.

The amount paid by the British is based on depreciation due to the intensive use of the tools under wartime conditions and represents an agreed estimate of the value they will have after they are no longer required for the war effort.

Reworking of the Adirondack magnetite mines will probably not die out when the war ends. Recent operations have proved that a high grade product can be supplied to the blast furnace.

The vast ore resources are as yet hardly scratched and when these mines and concentrators can be operated at full capacity, when manpower problems disappear, costs will be brought to a competitive position with those of Lake Superior ores deliveries to the blast furnace.

CHART OF COMPARABLE

THE tables and charts shown below and on the following two pages, are revisions of similar data that appeared in THE IRON AGE, Aug. 28, 1941, and have been prepared by Rolf G. Sartorius metallurgist, National Lock Washer Co., Newark, N. J. A great deal of technical and commercial information regarding the principal tool steels has been gathered together in a rather limited space for quick reference. Mr. Sartorius has grouped his steels according to type numbers, following the matched tool steel system developed by the Carpenter Steel Co. and exemplified in the nine-diamond diagram (opposite), which is reproduced

with permission of that company. The general designations of grades are Carpenter's also, but the numbered designations are those used by the National Lock Washer Co.

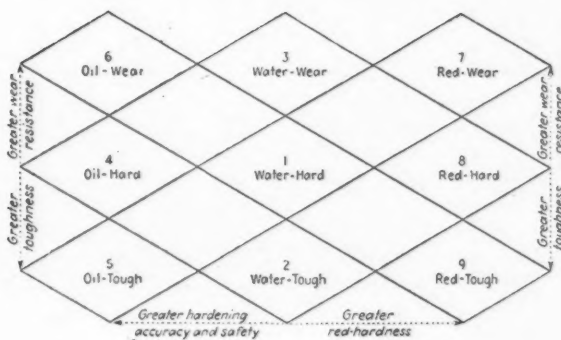
These tables answer many questions regarding the selection of tool steels. The large table presents the trade names and manufacturers of the nine main classifications of tool steels, and the auxiliary tables summarize the application, approximate heat treatment, and chemical composition of each type not strictly within the type analyses. In addition, for No. 7 grade, which is ordinary high speed steel, and for No. 8, which is a tungsten hot-work steel,

Tool Steel Suppliers	GRADES					
	1	2	3	4	5	6
Carpenter Steel Co.	No. 11 Special	Solar	K-W	Stentor	R. D. S.	Hamp
Bethlehem Steel Co.	XX	Omega	Finishing	Tool Room Oil Hardening	Bethalloy	Lehigh Tool "S"
Crucible Steel Co.	Sanderson Extra	La Belle Silicon No. 2	Crucible Double Special	Ketos or Champion Non-Changeable	Champaloy	H.Y.
Ackerlind Steel Co.	White Label			Green Label or Violet Label		Vict Hi Ch
Vanadium-Alloys Steel Co.	Colonial No. 14	Silman or Mosil	Colonial No. 4	Colonial No. 6 or Non-Shrinkable	Nikro M	Cro
Heller Bros. Co.	Blue Label			Gray Label		Die L
Latrobe Elec. Steel Co.	Extra Carbon	Damascus	E.S.A.	Mangano Special	N.D.S.	G.S.
Allegheny Ludlum Steel Corp.	Pompton Extra	Ludlum No. 602 or No. 609		Saratoga or Deward		Hur
Jessop Steel Co.	Lion Extra	Magic Chisel	Rapid Finish	Truform	Extra Tough No. 4	3-C Die S
Wheelock, Lovejoy & Co.	Whelco Standard		Whelco Finishing	Whelco Oil Hardening		
Joseph T. Ryerson & Son	VD			Ry-Alloy		
Universal-Cyclops Steel Corp.	Cyclops Extra	Venango	Saturn	Wando		Ultradie
Vulcan Crucible Co.	Extra	4870	Regal	Non-Shrinkable		Hi-P
Firth Sterling Steel Co.	Special	Chimo	R.T.	Invaro		Triple Die
Braeburn Alloy Steel Corp.	Extra	Triton		Kiski		Superior
Midvale Steel Co.	Carbon Tool Extra	Duredge	Finishing	Constant		Diamond Brand
Columbia Tool Steel Co.	Extra		Double Special	EXL-Die		Super
A. Milne & Co.	Red Label	MSM	Fast Finishing	Amcoh		Double
Simonds Saw & Steel Co.	Blue Label	Havoc		Teenax No. 46		
Henry Disston & Sons	Extra	D-29	Celero	Mansil Oil Hardening	Nicroman	812 Die
Timken Roller Bearing Co.	Graph-Sil	Graph-Al	Graph-Tong	Graph-Mo		

PARLE TOOL STEELS

general substitute molybdenum alloy steels are given in grade Nos. 7' and 8' because of restrictions placed on tungsten alloy steels by the war program. More recent easing of alloy restrictions has permitted usage of tungsten-molybdenum type high speed steel (7'') and chromium-tungsten-molybdenum hot work steel (8''). Alternate analyses for No. 6 grade are also given, although this material is not primarily a tungsten steel.

These charts supplement the directory of "1500 Tool Steels" published serially in THE IRON AGE and available in booklet form.



6	6'	7	7'	7''	8	8'	8''	9
Hamp	No. 610 Hardening	Star Zenith	Star-Max.	Speed Star	D.Y.O.		No. 883	Excelo
Lehigh D	Hot Die and Tool "S"	Special High Speed	H.M. High Speed	No. 66 High Speed	No. 57 Hot Work	No. 445 Hot Work	Bethlehem Cr-W-Mo Hot Work	No. 67 Chisel Steel
H.Y.	Hot Die 150	Rex AA	Rex TMO or Rex VM	Rex M-2	Peerless A	Crescent Hot Work No. 2 or LaBelle 89	Chro-Mow	Atha Pneu
Vict	Hi Ch			A.S. No. 86				Hot Die Steel
Cro	Hot Die	Red Cut Superior	8-N-2	6-6-2	Marvel	Choice No. 1 or Choice No. 2	Hotform	Par-Exc.
	Die L	Red Label Peerless				Brown Label		Orange Label
G.S.	N. Special	Electrite No. 1	Electrite Tatmo	Electrite Double Six	C.L.W.	Select	L.P.D.	X.L. Chisel
Hun	Ontario	LXX	L.M.W.	DBL-2	Atlas A or Atlas B	EB Alloy	Potomac	Seminole Hard
3-C	Die S	Supremus	Mogul	Mustang	2 B-MC or Dica C	J.J. Hot Work	Dica B	Top Notch
		Whelco High Speed				Whelco Hot Die		
Ultradie	Hot Die No. 2	B-6	Mo-Tung	Mo-Tung 652	B-44	Ajax No. 2	Thermold "B"	Alco
Hi-P	Alidie	Wolfram	Vul-Mo	T-M-5	No. 30 or No. 45 Calo Ferro	4-H.W.	T.C.M.	Q.A.
Triple Die	Removan	Blue Chip		Star-Mo	L.T. Forging Die	C.Y.W.	H.W.D.	J.S. Punch and Chisel
Superior	Hot Die No. 3	Vinco	Mo-Cut	Braemow	T-Alloy	Hot Die No. 2	Pressurdie No. 2	Vibro
Diam		Two Star			Bolt Die Special or Nut Piercer	Bolt Die Regular		
Super	Almodie	Clarite		Molite	Formite	Phoenix	Firedie	Buster
Double	High Production	AMC	M-M-I	MM 6 & 6	3074 Hot Work	Chrome Hot Work		AO 20
	C.C.M.	Red Streak	S.T.M.	Molva-T	D.N.V.	Chrome Hot Die		Commando No. 47
812 Die	Croloy	Kutkwik	Di-Mol	6-N-6	Eltun	H.R.W.		Keystone Alloy Chisel
	M.N.S.							

— Application — Approximate Heat Treatment — Chemical Composition —

No. 1—WATER HARD—Straight Carbon or Low Alloy Tool Steel. (Medium Hardness Penetration).

This is the key steel and ALL tools should be made from it unless there is some good reason for going to some special alloy steel. This is a shallow hardening steel that will resist wear and abrasion; it is not recommended for tools that must hold size accurately in hardening.

No. 1 ANALYSIS									
	C	Mn	Si	Ni	Cr	Va	Mo	W	
Type Analysis	0.70-1.10	0.20-0.30	0.20-0.25						
Ackertind	1.10	0.25	0.25			0.20			
Ryerson	0.95	0.27	0.20			0.18			
Timken	1.50	0.50 max.	0.90						
Universal-Cyclops	0.70-1.25	0.25	0.25						
Wheelock, Lovejoy	1.00	0.30				0.18			

No. 2—WATER TOUGH—Si-Mn-Water (or Oil) Hardening Tool Steel.

When No. 1 Tool Steel is not TOUGH enough for a job, use No. 2 Tool Steel. This is a shallow hardening steel that will resist wear and abrasion; it is not recommended for tools that must hold size accurately in hardening.

No. 2 ANALYSIS									
	C	Mn	Si	Ni	Cr	Va	Mo	W	Al
Type Analysis	0.50-0.60	0.70-0.80	1.50-2.00				0.20-0.40		
Carpenter	0.50	0.40	1.00				0.50		
Bethlehem	0.60	0.70	1.90			0.20	0.45		
Vanadium-Alloys	0.55	0.85	2.10		0.25				
Latrobe	0.55	0.90	2.05		0.25	0.30			
Jessop	0.50	0.50	2.00						
Vulcan Crucible	0.55	0.85	2.00		0.25	0.30			
Simonds	0.50	0.40	1.00			0.20	0.50		
Diesion	0.55	0.80	1.30			0.10	0.50		
Timken	1.50	0.30 max.	0.25					0.20	
Universal-Cyclops	0.50	0.40	1.10			0.20	0.50		
Crucible	0.60	0.75	1.90		0.25		0.30		

No. 3—WATER WEAR—W-Water Hardening.

This is a shallow hardening steel that will resist wear and abrasion; it is not recommended for tools that must hold size accurately in hardening.

No. 3 ANALYSIS									
	C	Mn	Si	Ni	Cr	Va	Mo	W	Al
Type Analysis	1.20-1.30	0.20-0.30	0.25-0.40				0.50-0.60		
Latrobe	1.40	0.25	0.25		0.50	0.30			

No. 6—OIL WEAR—High Carbon, High Chrome.

This is essentially a non-deforming tool steel of extreme wear resistance; it is a deep hardening steel and has a very high compressive strength.

No. 6 ANALYSIS									
	C	Mn	Si	Ni	Cr	Va	Mo	W	Co
Type Analysis	1.80-2.25	0.25-0.35	0.25-0.30	0.50	12.0-14.0				
Bethlehem	2.05	0.40	0.35		12.00	0.60			
Vanadium-Alloys	2.20	0.20	0.30		12.00	0.80			0.50
Columbia	2.10	0.30	1.00		10.50			1.00	
Universal-Cyclops	2.35	0.25	0.25		12.00	0.20			
Latrobe	2.20	0.55	0.50		13.25				
Crucible	2.25				11.50	0.20	0.80		
Jessop	2.15	0.40	0.50		12.50	0.20		0.25	0.30

No. 6' ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W	Co
Type Analysis	1.50-2.25	0.20-0.30	0.30-0.35		11.5-12.0	0.20-1.00	0.75-0.90		
Bethlehem	1.60	0.35	0.46		12.00	0.35	0.75		
Vanadium-Alloys	1.55	0.25	0.38		12.00	0.80	0.80		0.40
Timken	1.50	1.25	1.00	1.75	0.50		0.50		
Jessop	1.55	0.30	0.30		11.50	0.25		0.95	

No. 7—RED WEAR—18-4-1 High Speed.

This is the ONLY steel suitable for making metal cutting tools that become hot (over 300° F.) in service.

No. 7 ANALYSIS									
	C	Mn	Si	Ni	Cr	Va	Mo	W	
Type Analysis	0.50-0.75	0.15-0.30	0.15-0.30		3.50-4.00	1.00-1.50		18.0-19.0	
Latrobe	0.75	0.25	0.25		4.10	1.10	0.75	18.00	

No. 7' ANALYSIS									
	C	Mn	Si	Ni	Cr	Va	Mo	W	
Type Analysis	0.75-0.80	0.20-0.30	0.30-0.35		3.75-4.00	1.00-1.15	8.00-9.00	1.50-1.60	
Crucible	0.85				4.00	1.90	8.00		
Columbia	0.80	0.30	0.30		4.00	2.00	9.00		
Latrobe	0.80	0.25	0.25		4.00	1.15	8.30	1.70	

No. 7' ANALYSIS

	C	Mn	Si	Ni	Cr	Va	Mo	W	
Type Analysis W-Mo	0.80-0.85	0.20-0.35	0.25-0.40		3.90-4.40	1.50-2.00	4.00-5.00	5.50-6.50	

No. 7 th ANALYSIS										
Type Analysis	W	Mo	C	Mn	Si	Ni	Cr	Va	Mo	W
These are a general guide only. For working size steel use the following ranges.										
Hot Forming Dies Gripper Dies Hot Forming Dies Hot Swaging Dies Semi-Hot Work Dies Hot Forging Punches Forging Mandrels										
Preheat to 1550° F.; Quench 2150°-2200° F. in Oil (Air) (45 Rockwell C)										
Temper 1100°-1300° F. (46-38 Rockwell C)										
No. 8 ANALYSIS										
Type Analysis	W	Mo	C	Mn	Si	Ni	Cr	Va	Mo	W
These are a general guide only. For working size steel use the following ranges.										
Hot Forming Dies Gripper Dies Hot Forming Dies Hot Swaging Dies Semi-Hot Work Dies Hot Forging Punches Forging Mandrels										
Preheat to 1550° F.; Quench 2150°-2200° F. in Oil (Air) (45 Rockwell C)										
Temper 1100°-1300° F. (46-38 Rockwell C)										
No. 8 th ANALYSIS										
Type Analysis	W	Mo	C	Mn	Si	Ni	Cr	Va	Mo	W
These are a general guide only. For working size steel use the following ranges.										
Hot Forming Dies Gripper Dies Hot Forming Dies Hot Swaging Dies Semi-Hot Work Dies Hot Forging Punches Forging Mandrels										
Preheat to 1550° F.; Quench 2150°-2200° F. in Oil (Air) (45 Rockwell C)										
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Type Analysis	W	Mo	C	Mn	Si	Ni	Cr	Va	Mo	W
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No. 8 th ANALYSIS										
Type Analysis	W	Mo	C	Mn	Si	Ni	Cr	Va	Mo	W
These are a general										

Type Analysis		Combination Dies Universal Blanking Dies Notching Dies Notching Punches	Placing Punches Reamers Arbors	Brass Cutting Tools Die Collars Forming Dies	Forming Punches Forming Rolls Boreforming Tools
		1.20-1.35	0.20-0.25	0.20-0.30	0.50-1.00
Latrobe		1.40	0.25	0.25	0.50 0.30
Jessop		1.35			0.75
Wheelock Loveloy		1.30			0.40 4.00
Universal-Cyclops		1.35	0.25	0.25	0.20 max. 3.50
Firth Sterling		1.30	0.40		0.25 3.50
Milvale		1.45			0.75 4.25
Columbia		1.30	0.25	0.45	0.50 3.25
Dixton		1.35	0.25	0.20	0.25 2.75
Timken		1.50	0.50 max.	0.65	0.50 2.80

No. 4—OIL HARD—Non-Deforming.

Use this steel in place of No. 1 tool steel whenever greater **ACCURACY or SAFETY** in hardening is desired.

Tapering Dies
 Reamer Dies
 Sub-Process Dies
 Lamination Dies
 Forming Dies
 Precision Tools
 Broaches
 Temper 375° F. (61-62 Rockwell C)
 Quench 1420°—1475° F. in Oil (64-65 Rockwell C)

No. 4 ANALYSIS

Type Analysis	C	Mn	Si	Ni	Cr	Va	Mo	W
Carpeniter	0.85-0.95	1.00-1.50	0.20-0.40		0.50-0.60			0.45-0.55
Ackerling Violet Label	0.90	1.60	0.25					
Allegheny-Ludlum	0.90	0.30 max.	0.25		0.50	0.20		1.50
Jessop	0.90	1.50	0.20				0.30	
Ryerson	0.90	1.17	0.35			0.20		0.50
Vulcan Crucible	0.92	1.78	0.29				0.27	
Simonds	0.90	1.55			0.25			
Timken	0.90	1.25	0.20		0.50	0.20		0.50
	1.50	0.50 max.	0.80				0.25	

Electrode Tip Wear In Spot Welding

UNDER the stimulus of large scale production during recent years many electrical devices have been developed for the accurate control of spot welding machines. It was obvious that some means of controlling electrode tip size was essential to maintain consistent welding results. Based on experimental work first carried out on the spot welding of light alloys, it was found that due to the high conductivity of the material used the electrode tip diameter should be controlled within certain limits to maintain the high degree of weld consistency required. No information was available, however, regarding electrode tip wear in connection with the welding of mild steel sheet and the experimental work now

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completed deals with this subject. The results of comparative tests carried out at the same time on two standard electrode materials are also available. The results of the investigation on

the spot welding of 20 S.W.G. mild steel sheet have been published in the Journal of the Institution of Production Engineers (Great Britain) in December, 1942. For comparative purposes some of the test results obtained are included in this report.

The investigation included the welding of 20, 16 and 10 gage mild steel sheet. Auto body sheet was used in the 20 and 16 gage tests and low car-

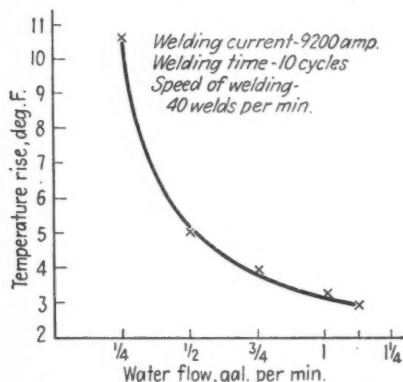


FIG. 1—Temperature rise of cooling water with varying rates of flow.

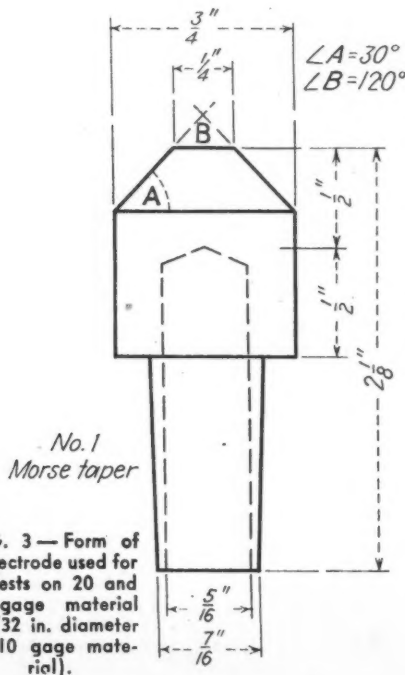


FIG. 3—Form of electrode used for all tests on 20 and 16 gage material (11/32 in. diameter for 10 gage material).

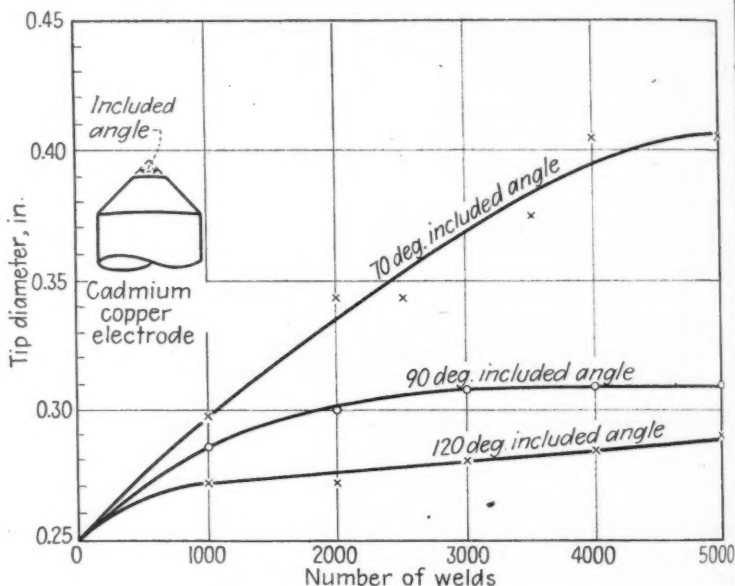
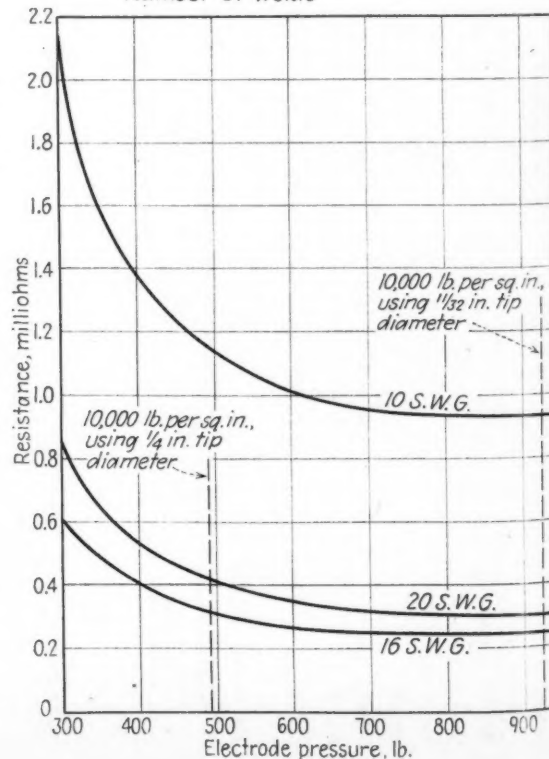


FIG. 2—Results of tests on tip wear for 20 and 16 gage material using an initial tip diameter of 1/4 in. Tip life increased by reducing the angle at the base of the cone

(see Fig. 3).

Welding current—8200 amp.
Welding time—10 cycles
Welding pressure—10,000 lb. per sq. in.
Speed of welding—40 welds per min.
Water cooling—1 gal. per min. per electrode

FIG. 4—Resistance measurements taken on two thicknesses of sheet held between the electrodes at various pressures.



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bon single pickled material for the 10 gage tests.

The electrode materials used were: (a) copper containing 0.9 per cent of cadmium and (b) copper containing 0.6 to 0.7 per cent chromium. The copper chromium alloy has a higher softening temperature than cadmium copper and less tip wear was anticipated. It was therefore decided to obtain a comparison with a standard electrode material such as cadmium copper.

The work was carried out on a 250 kva. experimental spot welding machine installed in the welding laboratory of the Pressed Steel Co. This machine is fully automatic, both the pressure and welding cycle being controlled by thyatron control panels operating in conjunction with mechanical timers.

Preliminary Experimental Work

Water cooling: A series of tests were carried out to determine the minimum rate of flow of cooling water through the electrodes using standard electrodes in which the water was circulated to within $\frac{1}{2}$ in. of the tip surface. The temperature rise of the cooling water was recorded for various rates of flow. The results when using a welding speed of 40 welds per min. are shown in Fig. 1. They indicate that efficient cooling is obtained with a rate of flow of 1 gal. per min.

Form of electrode tip: Standard conical shaped tips were used for a series of tests on tip shape. It was found that by reducing the angle at the base of the cone the tip life could be considerably increased. The results of the tests are illustrated graphically in Fig. 2, while the form of electrode used for all tests is shown in Fig. 3. The initial tip diameter used was $\frac{1}{4}$ in. for 20 and 16 gage material and $11/32$ in. for the 10 gage sheet.

Electrode pressure: Resistance measurements were taken on two thicknesses of sheet held between the electrodes at various pressures, the test pieces being removed before each pressure test. The tip diameters used were similar to those used on the actual welding test. The resistance was obtained by measuring the voltage drop across the electrode tips when connected to a low voltage d.c. supply. The results obtained are illustrated graphically in Fig. 4.

... Careful observation of changes in the form and size of electrode tips due to wear helps to attain a high degree of welding consistency, according to elaborate experimental work carried out in a British plant. The data were supplied through the courtesy of "Sheet Metal Industries."

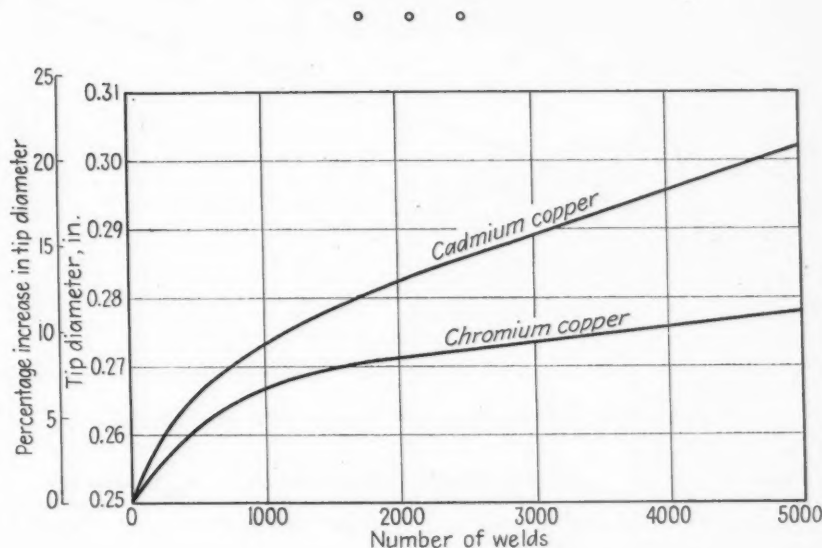


Fig. 5—Spot welding tests for 20-gage mild steel sheets.

Welding Current.....9220 amp. Speed of welding.....40 welds/min.
Welding time.....10 cycles Water cooling.....1 gal./min./electrode
Welding pressure.....10,000 lb./sq. in. Nominal tip diameter..... $\frac{1}{4}$ in.

No. of Welds	Contact Area Sq. In.	Tip Diameter In.	Tip Area Sq. In.	Average Weld Strength per Spot Lb.
Cadmium Copper Electrode				
0	0.0400	0.25	0.0491	1100
250	0.0400	0.26	0.0533	1320
500	0.0425	0.27	0.0574	1150
1000	0.0423	0.27	0.0574	1270
1500	0.0450	0.28	0.0614	1210
2000	0.0450	0.28	0.0614	1310
2500	0.0450	0.28	0.0614	1260
3000	0.0475	0.29	0.0660	1320
3500	0.0500	0.29	0.0660	1220
4000	0.0525	0.30	0.0706	1180
4500	0.0525	0.30	0.0706	1300
5000	0.0550	0.30	0.0706	1320
Chromium Copper Electrode				
0	0.0375	0.25	0.0491	1190
250	0.0375	0.26	0.0533	1190
500	0.0375	0.26	0.0533	1370
1000	0.0375	0.27	0.0574	1280
1500	0.0400	0.27	0.0574	1280
2000	0.0425	0.27	0.0574	1120
2500	0.0425	0.27	0.0574	1280
3000	0.0425	0.27	0.0574	1220
3500	0.0425	0.275	0.0594	1120
4000	0.0425	0.275	0.0594	1280
4500	0.0425	0.275	0.0594	1090
5000	0.0425	0.28	0.0594	1100

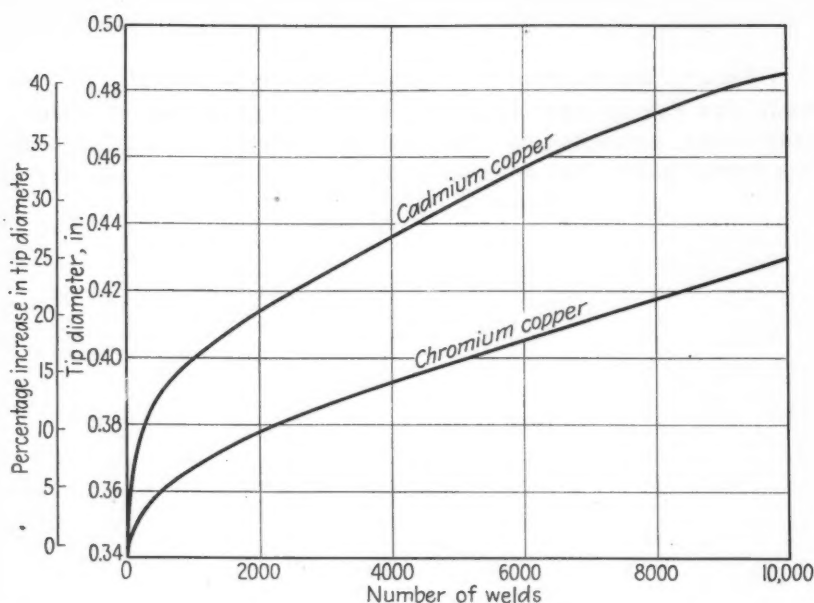


Fig. 6—Spot welding tests for 16-gage mild steel sheets.

Welding current.....9000 amp. Speed of welding.....40 welds/min.
Welding time.....13 cycles Water cooling.....1 gal./min./electrode
Welding pressure.....10,000 lb./sq. in. Nominal tip diameter.....1/4 in.

No. of Welds	Contact Area Sq. In.	Tip Diameter In.	Tip Area Sq. In.	Average Weld Strength per Spot Lb.
Cadmium Copper Electrode				
0	0.0375	0.25	0.0491	1970
250	0.0375	0.26	0.0531	1940
500	0.0400	0.265	0.0551	1920
1000	0.0400	0.275	0.0594	1880
1500	0.0450	0.285	0.0638	1890
2000	0.0450	0.290	0.0661	1840
2500	0.0475	0.295	0.0683	1890
3000	0.0475	0.300	0.0707	1920
3500	0.0475	0.300	0.0707	1910
4000	0.0475	0.300	0.0707	1920
4500	0.0475	0.300	0.0707	1900
5000	0.0475	0.300	0.0707	1940
6000	0.0475	0.300	0.0707	1960
7000	0.0475	0.305	0.0731	1920
8000	0.0475	0.305	0.0731	1890
9000	0.0475	0.305	0.0731	1920
10000	0.0475	0.310	0.0755	1900
Chromium Copper Electrode				
0	0.0375	0.25	0.0491	1860
250	0.0375	0.255	0.0511	1860
500	0.0400	0.26	0.0531	1900
1000	0.0400	0.26	0.0531	1880
1500	0.0425	0.265	0.0551	1880
2000	0.0425	0.265	0.0551	1870
2500	0.0425	0.265	0.0551	1840
3000	0.0450	0.270	0.0573	1860
3500	0.0450	0.270	0.0573	1850
4000	0.0450	0.270	0.0573	1880
4500	0.0450	0.275	0.0594	1910
5000	0.0450	0.275	0.0594	1870
6000	0.0450	0.280	0.0616	1870
7000	0.0450	0.280	0.0616	1860
8000	0.0450	0.280	0.0616	1880
9000	0.0450	0.280	0.0616	1850
10000	0.0450	0.280	0.0616	1870

Microscopic examination of the sheet surfaces showed that the 20 S.W.G. sheet had a rougher surface than the 16 S.W.G. sheet and the results indicate that the sheet surface is the controlling factor in resistance values on the thinner gages of material. The welding pressure used on the actual welding tests was 10,000 lb. per sq. in. of electrode tip area and the broken lines on the graph indicate that the resistance is approaching a constant value under these conditions.

Welding current and time: It is possible to use a large selection of current and welding time settings but in these investigations the object was to use high welding currents and short welding times. The settings selected were the maximum values at which sparking during welding was eliminated.

Speed of welding: A welding speed of 40 welds per min. was used on all tests. This average speed of welding is not likely to be exceeded on a continuous production line.

Description of Tests

The following procedure was adopted for all thicknesses of material. The electrodes were set up in the machine and preliminary test pieces were welded and tested in a tensile testing machine. The contact area and tip diameter were recorded and the test run started up. At selected intervals the run was stopped and three test specimens prepared. These consisted of welding two strips of the material under test 6 in. long by 1 1/4 in. wide. An overlap of 1 in. was used and one spot weld was made in each specimen. The average breaking load for the three specimens was recorded. At the same time the tip diameter and tip contact area were also recorded. The test runs were continued for 10,000 welds on the 16 and 10 gage material. On the 10 S.W.G. material a test run of 40,000 welds was made using 3/16 in. electrode tip diameter but for comparative purposes the results of a test run of 5000 welds using 1/4 in. diameter electrode tips are given.

The test results for cadmium copper and chromium copper electrodes are given in Figs. 5, 6, and 7 and in the tabular matter.

It is clearly illustrated that a longer tip life can be obtained when using chromium copper.

A further important conclusion is that the contact area in all tests increases only by a very small amount. This is particularly noticeable as the sheet thickness is increased. The electrode tip area does not appear to be related to the actual contact area. The object of running the tests for

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10,000 welds was to obtain an electrode tip size at which unsatisfactory weld strengths were obtained. It was therefore surprising to find that the weld strength was maintained after the test run was completed.

It was observed when welding the thicker gages of material that as the electrode tips sunk into the sheets due to the softening of the steel there was a tendency for wear to occur round the circumference of the tip, leaving an area slightly "proud" on the tip surface. Tip surface is the actual contact area and the wear taking place round the circumference of the tip automatically maintains this surface area at almost a constant value.

It has been observed on high speed production lines that satisfactory spot welds can be obtained on 20 S.W.G. mild steel sheet when electrode tips have increased 100 per cent of the original tip diameter. These results however have only been obtained when the parts to be welded are a good fit. When badly fitting parts have to be spot welded a large increase in the tip diameter considerably reduces the pressure per square inch of tip area and faulty welds are obtained.

In making use of these experimental results it should be noted that the spot welding was carried out under ideal conditions.

Conclusions of these tests are briefly listed as follows:

1. The amount of tip wear obtained depends upon the shape of the electrode tip. A truncated cone having an angle of 30 deg. at the base is recommended.
2. Electrode tip wear can be reduced by using chromium copper.
3. The increase in tip area is not related to the increase in actual contact area.
4. When similar experimental work was carried out on the spot welding of light alloys the weld strength was considerably reduced after 2000 welds and the growth of the tip diameter was therefore strictly controlled. This was achieved by limiting the number of welds to 1500. It is obvious however from the experimental work now completed that the requirements as to electrode tip maintenance governing the welding of light alloys are not applicable to the spot welding of mild steel. Much greater latitude is permissible for the welding of the latter. These tests were carried out on a reactance type d.c. operated spot welder.

Acknowledgments: The author wishes to express his thanks to the management of the Pressed Steel Co. Ltd. and to the Institution of Production Engineers for placing this data at his disposal.

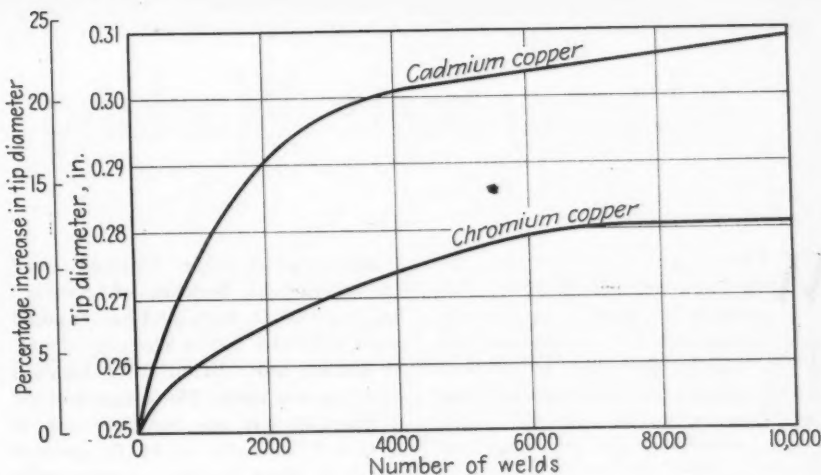


Fig. 7—Spot welding tests for 10-gage mild steel sheet.

Welding current.....13,600 amp. Speed of welding.....40 welds/min.
Welding time.....20 cycles Water cooling.....1 gal./min./electrode
Welding pressure.....10,000 lb./sq. in. Nominal tip diameter.....11/32 in.

No. of Welds	Contact Area Sq. In.	Tip Diameter In.	Tip Area Sq. In.	Average Weld Strength per Spot Lb.
Cadmium Copper Electrode				
0	0.0525	0.3437	0.0928	5300
250	0.0555	0.38	0.1134	5400
500	0.0555	0.39	0.1195	5000
1000	0.0555	0.40	0.1257	5150
1500	0.0555	0.41	0.1320	5500
2000	0.0600	0.415	0.1352	5550
2500	0.0600	0.415	0.1352	5550
3000	0.0600	0.42	0.1386	5400
3500	0.0600	0.43	0.1452	5550
4000	0.0600	0.435	0.1486	5400
4500	0.0600	0.44	0.1521	5450
5000	0.0600	0.450	0.1591	5550
6000	0.0600	0.460	0.1662	5450
7000	0.0600	0.465	0.1698	5400
8000	0.0600	0.470	0.1735	5300
9000	0.0600	0.480	0.1809	5500
10000	0.0600	0.485	0.1847	5450
Chromium Copper Electrode				
0	0.0525	0.3437	0.0928	5510
250	0.0550	0.355	0.0990	5200
500	0.0550	0.36	0.1018	5520
1000	0.0600	0.37	0.1075	5500
1500	0.0600	0.375	0.1104	5650
2000	0.0600	0.375	0.1104	5500
2500	0.0600	0.38	0.1134	5450
3000	0.0600	0.385	0.1164	5400
3500	0.0600	0.390	0.1195	5450
4000	0.0600	0.390	0.1195	5600
4500	0.0600	0.395	0.1225	5300
5000	0.0600	0.400	0.1257	5400
6000	0.0600	0.405	0.1288	5000
7000	0.0600	0.410	0.1320	5550
8000	0.0600	0.415	0.1352	5450
9000	0.0600	0.425	0.1419	5500
10000	0.0600	0.43	0.1452	5300

Large Scale Working of Adirondack

WITH minor variations, the process of beneficiating Adirondack magnetites is the same throughout the mountains and will be briefly described to present both economic and engineering factors*. Essentially there are six stages in the ore processing: crushing and

**For a highly detailed description of the mining operations, mill equipment, flow sheets and historical data on these six Adirondack magnetite mines and mills, the reader is referred to the November, 1943 Adirondack iron mining issue of "Mining and Metallurgy," publication of the American Institute of Mining & Metallurgical Engineers, New York.*

rough separation, milling or fine grinding, wet magnetic separation, dewatering the concentrate, mixing with a small percentage of anthracite, and finally sintering.

The basic economic problem of magnetic separation is to maintain the tailing loss at a minimum and at the same time strive for as high percentage of iron in the concentrate as possible. By proper control of the magnetic separators it is also possible to throw out undesirable elements like phosphorus to some degree. All these factors are tied up with the basic structure of the ore, the minerals with which it is associated and the method of mining. For example, drilling with jack drills underground in a confined space results in a more fragmented rock and therefore simplifies the crushing problem at the deep mine plants.

The newly reopened mines—Benson, Clifton and MacIntyre—are all being worked today as open pit mining operations and the quarrying pattern

is similar at all three. National Lead has opened 11 benches on Sanford Hill, each 35 ft. high, and has exposed practically the entire outcrop of ore. At Benson and Clifton 40 ft. benches or levels are used. The usual method of blasting out ore bearing rock is to sink 6 in. holes on 10 ft. centers and 10 ft. from the face of the bench. This is done with fishtail bit churn drills which are operated like a well driller. It takes about 8 hr. to drill the first 20 ft. and 16 hr. the next 20 ft. because of time lost in retracting the tools and pulling out the finely ground sludge. About 400 to 500 lb. of dynamite is lowered down each hole and the entire face blasted. Supplementing the churn drills are power fed, pneumatic wagon drills and hand held drills.

Power shovels, operated electrically or by diesels, pick up the broken rock and load it into trucks for hauling to the crusher. Pieces too big to handle with the dipper are drilled with compressed air and blasted.

Maintenance is the big item in this quarrying activity as it is in the crushing plant and in the concentrator mill. It is pure luck if all the power shovels and trucks are in operation at once. Even major repairs must be made on the premises and often right in the pit in the case of the big shovels. In the mill there are

bottlenecks galore caused by mechanical breakdowns—a motor burns out on the primary crusher, a 48 in. rubber belt begins to tear apart or the roller bearings get "shot" on the sintering machine pallet conveyors.

Crushing Practice

The crushing problem varies with the mining method and type of ore. At Benson Mine is the largest crusher in the mountains. Into this huge McCully gyratory crusher (Allis-Chalmers), which weighs 670,000 lb., ore bearing rock up to 4½ ft. thick and much longer is dumped directly from 35-ton trailer trucks. The product from this crusher is dropped by gravity to two 18 in. fine reduction crushers. This equipment is sunk in a 90 ft. pit, the dumping level of which is 125 ft. below surface. At present, ore is trucked down to the crusher. From 125 to 250 ft. below datum line (limit of open pit quarrying) the rock will be trucked up to the crusher house.

Most other Adirondack mines use jaw crushers for the primary reduction. At Clifton the ore tends to break into cubes and hence in the first reduction the crude ore can be brought down to 4¾ in. and finer, without difficulty. After screening, all material except the 1¼ in. under-size is sent over dry magnet pulley cobbles to separate the lump ore, which assays about 59 per cent iron, 8.19 per cent silica, 0.300 per cent sulphur, and 0.124 per cent phosphorus. Lump ore constitutes about 20 per cent of the crude ore output at Clifton. Rejects from the cobbles and undersize from the primary

THE huge piles of tailing rock at Lyon Mt. give evidence of the years of continuous operation of the present Chateaugay Division of Republic Steel Corp.



ck Magnetites

By FRANK J. OLIVER

crusher are then sent through a 16 in. gyratory crusher having a 2½ in. setting, after which it is reduced to ¾ in. in two reduction crushers before being wet milled.

At National Lead, also, it has been found that by crushing in three stages instead of the original two, overall output is materially increased and machinery maintenance reduced by not calling upon the primary jaw crusher to reduce the ore too finely. Before being sent to the short head bowl cone crushers (which operate in a closed circuit with double deck screens), the secondary crushed material is conveyed by belt over dry magnetic cobbbers, installed this past summer. Rejects from the cobbbers are discarded, instead of being reprocessed as at Clifton where cobbing is done to extract lump ore. About 20 per cent of the country rock is thrown out at this point.

Magnetic cobbbers are now also in use at Mineville to separate lump ore from the Old Bed primary crushed ore which comes through the jaw crusher at 5½ in. size and under. About 25 per cent of this crude ore is high enough in magnetic iron to produce a suitable lump ore for open hearth use. Rejects from the lump cobbbers are conveyed to the secondary crushing plant. Here the material is carried in closed circuit through a battery of double deck vibrating screens, cone crushers and double pulley type magnetic cobbbers, from which rock is discarded to waste. Ore ¾ in. and under is sent over to the rod mills in the new DPC concen-

... In the second and concluding part of the article, the various methods of beneficiating these ores are described. Crushing and fine grinding enables a concentrate containing up to 70 per cent iron to be obtained by magnetic separation. The product is then sintered.

trating plant nearer to Port Henry.

A similar arrangement is used at Lyon Mt. except that the primary crushing is done below surface and the ore is brought up in 8-in. lumps and under. At the headshaft, the material is screened and the coarse particles sent through a jaw crusher. Material passing a 2 in. mesh screen but retained in a ½ in. mesh is cobbled magnetically and rock containing less than 3 per cent iron is discarded. The magnetite bearing material is finally reduced to ¾ in. and under before conveyed to the concentrator plant for wet milling.

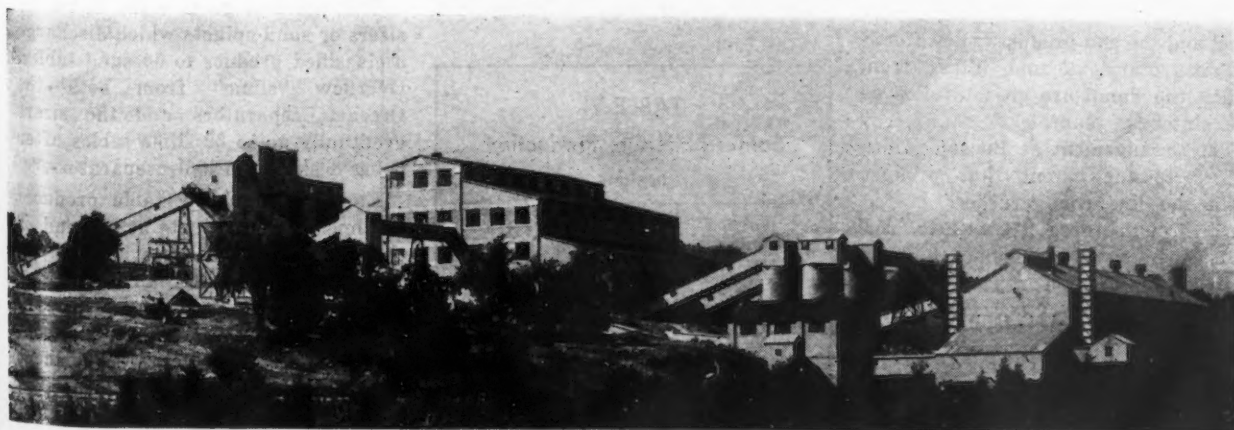
Thus it is seen that by the time the ore reaches the second stage of reduction, it is around ¾ to ¾ in. and finer, although in at least one plant, the product of the last gyratory reducer is nearer ¾ in. than ¾ in.

Degrees of fineness in wet grinding vary with the type of ore and the

end product sought. At MacIntyre Development of National Lead, for instance, where the primary problem is separation of the ilmenite from the magnetite, grinding is carried further than at the other mills and even finer grinding has been suggested to effect a better separation. As it is, the material will all pass through a 20 mesh screen (coarse particles are returned to the rod mill in closed circuit) and a high percentage (33) will pass a 100 mesh screen. Most other mines mill to 12 or 14 mesh maximum particle size.

Since milling and magnetic separation go hand in hand, the equipment for this purpose is generally under one roof. Every Adirondack concentrating plant is now employing wet magnetic separation, although some of the older plants changed over from dry to wet practice only in the past summer. Two types of wet separators are in use, the Crockett and the Linney types, each made by Dings Magnetic Separator Co. In both designs, the finely ground ore suspended in rapidly moving water is flushed or flowed against a wide rubber covered canvas belt which passes under a battery of powerful d.c. electromagnets.

THE new DPC concentrator and sintering plant operated by Republic near Mineville is arranged on a hillside to take advantage of gravity in handling crushed ore "pulp."

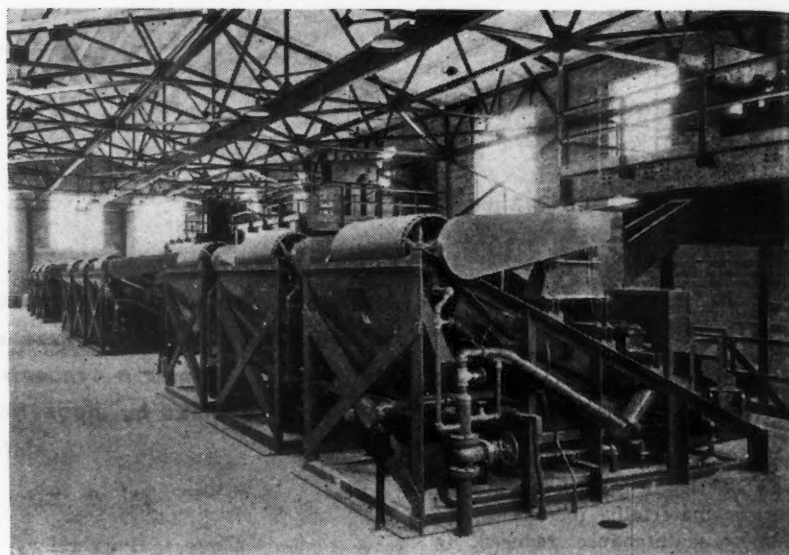


The Crockett type machines are a development of Robert E. Crockett, for many years general superintendent of the Scrub Oak mines of Alan Wood Steel Co. where New Jersey magnetites are concentrated. The Linney units are a modification worked out by Robert J. Linney, general superintendent, Port Henry Division, Republic Steel Corp. The Linney unit differs from the Crockett in that the tilt of the belt is steeper (about 30 deg. vs. 15 deg.) and the ore laden water is flushed against the belt with a hydrostatic head from a distributor box instead of flowing along the underside of the belt in a pan. In both machines the magnets, encased in a stainless steel housing, consist of a series of poles of alternate polarity which tend to roll over the magnetite particles held up against the belt. Dragging the ore under water from pole to pole severely agitates the particles, allowing the non-magnetic particles to drop into the middlings and tailings sections. The concentrate is given a final flush under the last several poles and then is discharged to a vibrating screen. In the Linney units, the magnetic particles are sprayed with jets of mill water, thus rolling them over and effecting what is claimed to be a more thorough separation.

Magnetic Separators

Magnetic separation is done in two stages, the second battery of separators being termed the finishers. The new magnetic concentrator near Mineville processes the crushed ore first through a set of nine 54 in. wide roughers and the concentrate drops by gravity to vibrating screens. Material passed by the screens goes directly to the finishing separators, while the coarse particles rejected by the screens are reduced in 8 x 12 ft. rod mills, one serving a battery of three rough separators. Coarse particles from the mills are again screened and the rejected ore recirculated through the mills. Fines go to a battery of 12 finishers on a third and lowest level and the end product is dewatered in six rotary vacuum filters from which the damp ore goes to silos at the sintering plant.

The arrangement at Benson Mines differs to the extent that product from the fine cone crushers is fed first through three 9½ x 12 ft. rod mills, then elevated by bucket chain to a battery of nine magnetic roughers on the upper deck. Oversize screened concentrates from the Crocketts is reduced in two 8 x 8 ft. ball mills before going to the finishers. Dewatering is done in dewater-



BATTERY of Linney type wet magnetic "roughers" at Republic's new DPC plant near Mineville.

ing cones, the sludge from which is then put through rotary vacuum filters.

At Clifton, product from the tertiary cone crushers go to a single 8 x 12 ft. ball mill and then is screened. Oversize particles are recirculated through the ball mill while 12-mesh undersize goes to three Crockett magnetic separators which combine rough and finish concentration by taking off three classifications—concentrate, middlings and tailings, the last named which goes to waste. The middlings are recirculated through the ball mill. Concentrate is partially dewatered in a settling cone, the sludge from which goes to a rotary vacuum filter and thence to the sinter plant.

At Lyon Mt., product from the last cone crusher goes to a rod mill, and up until the last summer, the coarse material (minus 10 mesh and plus 100 mesh) was separated dry. The minus 100 mesh material was concentrated on wet machines. Now the entire screened product of the rod mills eventually all goes to two batteries of rough and finishing wet

separators, the newest being the Linney type.

National Lead has a different problem since the primary end product is ilmenite and the secondary product magnetite sinter. The separation of these two products is difficult since ilmenite has much lower magnetic permeability than magnetite, which is about 40 per cent as magnetic as pure iron. In the wet mill four 6 x 12 ft. rod mills grind minus ¾ in. ore to 20 mesh. Screen undersize is split to 12 Crockett separators which produce magnetite, as well as middlings, tailings and slimes overflow. The magnetite concentrate is dewatered to about 15 per cent moisture in four rake dewaterers and is then delivered to a stock pile. This material analyzes around 57 to 58 per cent Fe and from 9.5 to 10.0 per cent TiO₂. Since the plant was in operation almost two years before sintering was started, 600,000 tons of magnetite concentrate has been piled up as a backlog for the sintering plant. All the remaining material is passed over a battery of 96 wet concentrating tables or jigs.

Tailings first go to eight hydraulic sizers or sand spigots which discharge a classified product to 64 sand tables. Overflow "slime" from both the Crockett separators and the sizers eventually go to 32 slime tables after being deslimed in hydroseparators.

Each concentrating table produces an ilmenite concentrate at the end of the table, a middling which is recirculated through the Crocketts and a tailing which is sent to waste in Lake Sanford. The tables are operated to produce a 37 to 38 per cent TiO₂ concentrate all of which is eventually dewatered by rakes and

TABLE VI
Sanford Hill Ore Production
July, 1944

Product	Tonnage	TiO ₂ %	Fe %
Crude ore.....	92,496	17.8	35.0
Magnetite conc....	35,461	9.7	58.3
Ilmenite conc.....	17,542	44.6	33.6*
Tailing.....	39,492	12.7	14.7

* Ilmenite is TiO₂ · FeO.

dried in stationary steam coil dryers. Final concentration is by 21 Wetherill dry magnetic separators, each having four coils and eight take-off cross belts. The first two belts, operating under low intensity magnets remove residual magnetite and the next five belts recover the ilmenite while the last belt product is a middling. Final ilmenite concentrate averages about 45 per cent TiO_2 . All of the magnetite from the Wetherills together with part of the middling is returned to the wet mill.

Because the slimes and tailings assay about 12 to 13 per cent ilmenite

relieved this problem to some extent inasmuch as about 20 per cent of gangue is eliminated at this point.

Recovery of mill water as well as precipitation of tailing fines is a problem at Benson Mines and in the Port Henry area. At both places Dorr thickeners have been installed to serve both purposes. Outside the DPC concentrator near Mineville is a 200 ft. diameter thickener in the open from which three-quarters of the water carrying tailings is recovered. The sludge raked from the thickener is dumped in a small collecting basin and none of the solids enters streams which feed Port Henry's water supply. At Benson Mines, two Dorr thickeners, 70 ft. in diameter, are housed under roof. The sludge is pumped by overhead pipe line to a tailing dump.

Sintering Practice

In all but the DPC sintering plant at the MacIntyre Development of National Lead, sintering is done in continuous pallet type Dwight-Lloyd machines. The two Dwight-Lloyd machines installed near Mineville are but two of five that Republic Steel Corp. has put up under DPC auspices in the WPB sponsored expanded steel capacity program. The other three are at Warren and Youngstown, Ohio, and at Spaulding, Ala. The two 72 in. machines at Mineville have an annual capacity of 382,000 net tons, or 1500 gross tons per 24 hr. There is one machine of similar size that has been in operation for some years at Lyon Mt. At Benson Mines there are two 72 in. machines of somewhat greater length, which allows them to be operated at a higher conveyor

travel. Hanna Ore Co. has one 72 in. machine at Clifton Mine.

Throughout the Adirondacks, the fuel used for sintering is anthracite culm, for many years stock piled as a waste product from the coal cleaners at eastern Pennsylvania anthracite mines. Delivered at Adirondack sintering plants, this fuel is worth about \$5 a ton, the bulk of which is freight charges. About $5\frac{1}{2}$ to 6 per cent of the culm is mixed with the magnetite concentrate in a pug mill just prior to being spread on the conveyor pallets in front of the ignition unit which is generally oil fired. (Blast furnace or natural gas is more often used in steel mill installations.) Both magnetite concentrate and the fuel are stored in silos and are distributed in the desired proportions by rotary feeders directly onto the belt supplying the pug mill. At Clifton presence of some pyrites in the ore results in a sulphur content up to 4.7 per cent maximum. This acts as a fuel and the anthracite percentage is altered accordingly. Sulphur in the sinter is not over 0.040 per cent.

Once ignited, combustion is maintained by drawing air through the bed which is about 6 to 8 in. thick. Hopper type collectors under the wind boxes entrap fine dust which is delivered by a series of spouts with vacuum discharge flaps to a collecting belt which returns the fines to the pug mill.⁷ Combustion of the anthra-

⁷ For a more complete description of such sintering machines see "Design and Operation of Modern Sintering Plants," part of a report of the annual meeting of the Asso. of Iron & Steel Engineers, THE IRON AGE, Oct. 5, 1944, p. 73.



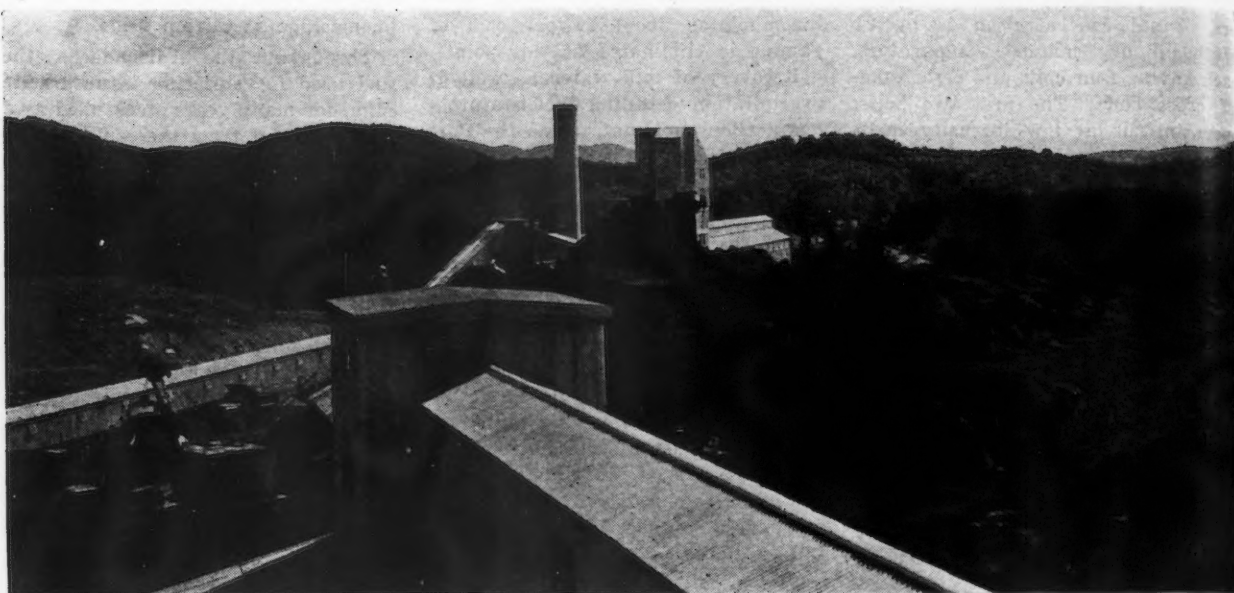
HIGH grade lump ore is being obtained in the Old Bed mine at Mineville by mining pillars in old mined out areas. This one is 100 ft. high and 40 ft. in diameter.

o o o

and from 14 to $14\frac{1}{2}$ per cent iron, plans are being considered to reprocess these tailings by flotation methods. About 600,000 tons of tailings form a delta in Lake Sanford. The fact that there is a relatively high iron content in the high specific gravity gangue materials which contaminate the table concentrate and are therefore nearly as magnetic as the ilmenite adds to the problem of loss of both ilmenite and iron in the tailings. (See Table VI). From the start of the milling operation, the slime load has been greater than originally anticipated and the slime tables have been overloaded to a great extent. The recent installation of cobbers after the tertiary rock crushers has

PART of the installation of Crockett wet magnetic separators at National Lead's plant at Tahawus.





THERE is 600,000 tons of magnetite concentrate stockpiled to feed the new DPC sintering plant just getting into operation at National Lead's MacIntyre Development at Tahawus.

cite is practically complete and for a brief interval the concentrate is brought to the fusion point. This together with the fact that the burning of this low ash fuel leaves voids produces a porous sinter cake which breaks up into large lumps as it drops off the end of the pallet conveyor and slides down grizzly bars into an awaiting freight car. There the sinter is immediately quenched with water sprays. A source of complaint from the railroads is that this quenching is not always as effective as it might be, resulting in the paint being burned off the hopper bottom freight car sides.

Improper loading of the cars has been another cause of complaint. Unless the high gravity sinter is loaded directly over the trucks at each end of the car, the heavy material is likely to overload the car framing. During the past summer, for instance, one railroad has scrapped six cars that developed "saddlebacks" from this cause.

Greenawalt Sintering Unit

The DPC sintering plant at Tahawus differs from others installed in the Adirondacks in that it is the non-continuous pan type. In this Greenawalt unit, by means of a traveling hopper car concentrate mixed with anthracite culm is spread to a depth of 14 in. over a grate pan measuring 25 x 10 ft. The bed is then fired by a traveling ignition machine which has three motor driven oil atomizers. Special heat resisting fans encased in cast steel housings create a vacuum

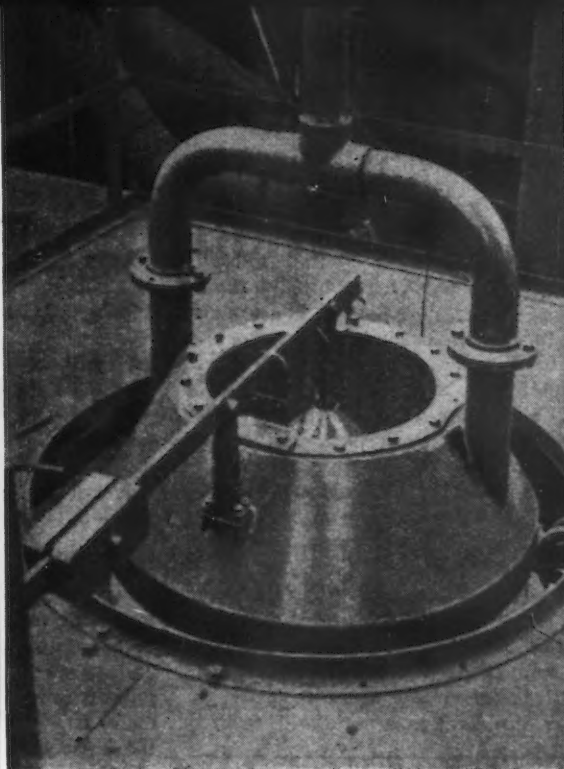
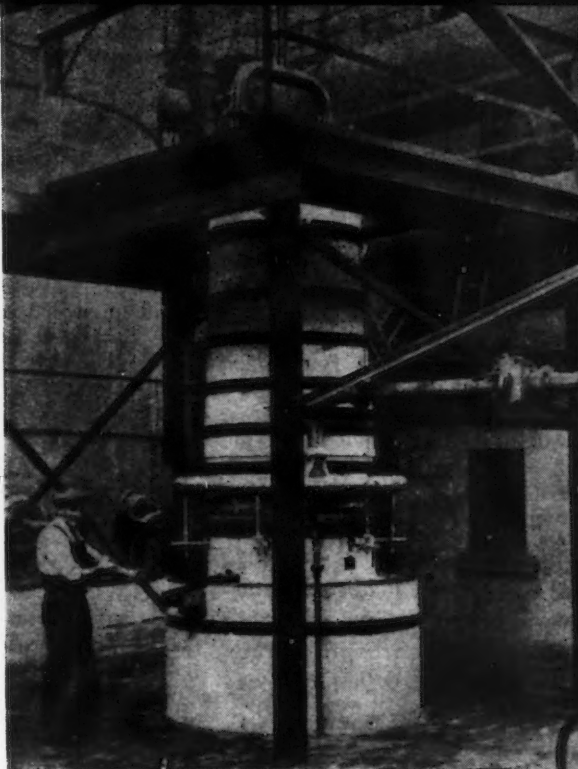
of 60 in. of water under the bed. Fusion of the concentrate is practically complete at the end of 25 min., when the pan is rotated 180 deg. and the contents dumped to a hopper bin below where the induced draft completes the burning of all traces of anthracite and ultimately cools the sinter so that it can be handled into freight cars without water quenching. Discharge from the bottom of the hoppers is by a roll feeder which breaks up the sinter cakes into lumps about 4 to 8 in. square. Each pan, of which there are three, yields about 12 long tons of sinter per cycle. Fines drawn through the grate bars are recovered in a cyclone dust collector and returned to the concentrate silos.

Because of the more complete burning of the fuel obtained through air cooling of the sinter, it is necessary to use only 4 per cent anthracite fines as against 6 per cent for water quenched sinter and a harder and more dense sinter is said to result. In fact the product is more nearly comparable with lump ore which must have sufficient density to sink through the slag layer in the open hearth. Such a new application of sinter has yet to be demonstrated, but experimental operation of the plant shows great possibilities. Lump ore carries a premium of \$1 a ton over sinter of this grade. This economic advantage would offset the higher cost of this plant under wartime conditions when reinforced concrete and cinder block was used in place of cheaper structural steel and plate construction.

From the above lengthy description, it should be clear that iron mining in the Adirondacks is not a wartime flash in the pan. Recent operations have proved that a high grade product can be supplied to the blast furnace. The vast ore resources, as yet hardly scratched, and the large investments of private as well as public capital confirm the future of the industry. While decisions as to the taking over of the DPC installations by private industry have yet to be made, in general the terms of the various leases are favorable to acquiring the properties. The royalties per ton charged as rental by the DPC are applicable to reducing the initial cost of the installation, although there are provisions for a minimum residual value which must be recovered by the government and for annual charges on the capital invested during the years of government ownership. Where new facilities were put up alongside of old, it is obvious that the lowest operating costs are obtained in the government owned plants. If surplus capacity exists after the war, this factor of costs may make the old plants surplus, rather than the new. Furthermore, with returning veterans, mines and concentrators operating now at only partial capacity, because of lack of manpower, can be operated at full blast, thereby bringing costs more in a competitive position with those of Lake Superior ores delivered to the blast furnace.

LEFT
FIG. 1 — General
view of the fur-
nace.

RIGHT
FIG. 2 — View of
dome, bell and
saucer.



Miniature Smelting

AS furnace dimensions have increased much has been written about "the largest blast furnace in the world." It is thought that a description of what is claimed to be "the smallest in the world" might at least be stimulating.

According to the *British Iron and Steel*, a working model blast furnace was constructed at the works of the Shelton Iron, Steel & Coal Co., Ltd., Stoke-on-Trent, for the Iron and Steel Industrial Research Council of the British Iron and Steel Federation. Certain special researches under the direction of the Blast Furnace Committee were to be undertaken which were found to be inconvenient on a full scale. Hence the birth of the one-eighth scale working model to be described.

Fig. 1 shows a general view of the furnace, the dimensions of which are:

Hearth diameter	..... 1 ft. 9 in.
Height to top of bell	..... 10 ft. 0 in.
Throat diameter	..... 2 ft. 2 in.
Bell diameter	..... 1 ft. 7 in.
Bell angle	..... 90°
Bosh diameter	..... 2 ft. 7½ in.
Number of tuyeres	..... 6
Diameter of tuyeres	..... 1¼ in.

Building of the furnace proper was commenced on a plinth constructed of firebricks with several courses of insulating bricks on the top of it. This made the taphole, cinder notch and tuyeres 3 ft. to 4 ft. above ground level—a convenient height for operation. With the exception of tuyeres no water cooling was incorporated, and the stack was not supported independently on columns but rested on

the bosh. The bosh was not reinforced, but steel bands were fastened around the stack—no casing to the shaft being used.

The dome, bell and saucer (Fig. 2) were simple mild steel welded construction, with two gas offtakes meeting centrally over the bell, the top gas going to waste through a bleeder. The hot blast main was steel tubing lagged with insulating material, the furnace obtaining hot blast via an insulated pipeline from the ordinary hot blast main to the furnace plant.

The tuyeres and blow pipes were fabricated in one piece out of hydraulic piping welded together. They were cooled by town water and discharged into a circular bosh built around the furnace in the usual way. Metal was allowed to run into a miniature pig bed (not shown in the illustration) with a capacity of four 112-lb. pigs. Slag was allowed to run on to the floor.

As is to be expected, the furnace was well supplied with instruments. Straight line blast temperatures could be obtained by bleeding in cold wind through a valve controlled by a photoelectric cell. Twin automatic stock rods were provided to give a continuous record of burden movement. In addition, there was the usual paraphernalia of the modern blast furnaces—blast temperature, pressure and flow recorders, top gas tempera-

ture pressure and CO₂ recorders and others.

At the onset some operating difficulties were encountered, chief among these being loss of heat from the hearth. It was found necessary to surround the latter and the bosh with insulating bricks, a 13½-in wall eventually being employed, when afterwards surprisingly few operating difficulties were met.

The furnace was charged with graded coke and Northamptonshire Ironstone with about 33 per cent Fe and 11 per cent SiO₂, the flux being 50 per cent limestone and 50 per cent dolomite. Flushing and tapping times were regular, some 448 to 560 lb. of slag being run from three flushes over the cinder notch per cast of iron (about 336 lb.) every 6 hr.

The following are the operating details:

Coke charge	..... 15 lb.
Ore charge	..... 20-25 lb. approx.
Limestone and dolomite	..... 8 lb.
Blast temperature	..... 400 deg.
Blast pressure	..... ¼ to 1 lb.
Blast flow	..... 200 cu. ft. per min.

Coke consumption,
4000 to 5000 lb. per ton approx.
Total iron made (13 weeks) 51
tons cwt. (about 4 tons per week).

Approximate analysis of iron:

C	P	Mn	S	Si
2.4	1.50	0.30	0.30	0.35

Approximate analysis of slag:

SiO ₂	FeO	Al ₂ O ₃	CaO	MgO	S
30.0	1.2	21.0	38.0	7.5	0.8

The furnace was blown continually for 13 weeks and put out by injecting steam into the tap hole and then raking out.

Magnesium Alloy

Metallography

... To facilitate the preparation of magnesium alloy specimens for metallographic study, the procedure described herein was developed in the laboratories of the Dow Chemical Co. Etchant formulas and a description of the microscopic appearance of the chief structural features of the commercial alloys are included as an aid to the inexperienced metallographer.

TO meet the problems arising from the increased interest in the metallography of commercial magnesium alloys coupled with the difficulty in obtaining trained metallographers, a routine method for the preparation and examination of these alloys has been developed. P. F. George, metallurgist with the Dow Chemical Co., Midland, Mich., describes the procedure in the August issue of the ASTM Bulletin.

Because magnesium and its alloys polish very rapidly, care must be exercised to prevent scratching and cold working the surface layer. Grinding is done on aloxite cloths Nos. 50, 150 and 320 and emery paper No. 0. The aloxite cloths and paper are mounted on disks rotating over oil tanks. The oil catches the dust generated during the grinding operation thus keeping it from the operator's face and preventing any fire hazard from its accumulation. To remove the cold-worked layer, this operation must be prolonged somewhat beyond the time required to eliminate the preceding scratches.

Two rotating wet laps covered with Vel Chamee* cloth are used for polish-

* Obtainable from John Ritzenthaler, 73 Franklin St., New York 13.

ing. A distilled water suspension of 600 alundum is used on the first wheel which has a speed of 400 to 600 revolutions per min. The cloth is maintained just moist enough to prevent seizure of the specimen. The specimen is rotated counter to the direction of the wheel until the scratches from the last emery paper have been removed and the specimen takes on a satin finish. Excessive polishing on

this wheel should be avoided since it results in undesirable relief of some of the harder constituents.

A suspension of relevelated alumina is used on the final polishing wheel. This can be prepared by thoroughly shaking a good grade of commercial levigated alumina with distilled water and after allowing it to stand for 3 hr. siphoning off the upper 2 in. of the supernatant suspension. The sediment can be reworked several times to yield additional solution. Filtered soap solution is added to the relevelated alumina suspension in the proportion of 20 cc. per liter.

The speed of the final wheel can range from 100 to 400 revolutions per min., and the specimen is rotated slowly counter to the direction of the wheel until a very high gloss is obtained. It is rinsed in running water, then in alcohol and dried in an air blast.

The choice of etchants used for microexamination depends more on the physical condition of the alloys than on their composition. For metal in the as-cast condition, and for all aged alloys, the glycol etchant having the following composition is perhaps best.

	Per Cent by Volume
Ethylene glycol	75
Distilled water	24
Concentrated nitric acid	1

The freshly polished specimen is immersed face up in the etchant for 5 to 15 sec., washed well in running water, then in alcohol and dried in a blast of air.

To show grain boundaries in the solution heat treated castings and most of the wrought alloys, the acetic-glycol etchant is used.

	Per Cent by Volume
Ethylene glycol	60
Distilled water	19
Glacial acetic acid	20
Concentrated nitric acid	1

For estimating the amount of massive compound in heat treated castings or in wrought metal, the phosphoric-pical etchant is used. This etchant stains the solid solution and leaves the compounds white.

Orthophosphoric acid	0.7 cc.
Picric acid	4.0 gm.
Ethyl alcohol (95 per cent) ..	100.0 cc.

The specimen is immersed in the etchant face up for about 10 to 20 sec. or until the polished surface is darkened. The specimen is then washed in alcohol and dried or it can be washed in alcohol, water, then alcohol again and dried. Washing directly in water will lighten the stain, and the contrast between the white compound and the darkened solid solution will be lessened.

For revealing the grain boundaries in the Dowmetal FS-1 alloy sheet (Al 3.0, Zn 1.0, Mn 0.3, Mg remainder) the acetic-pical reagent can be used. This etchant has also been found excellent for macro grain size determination. It must be made up fresh before each use but can be prepared readily by mixing the following two solutions:

Saturated picric acid in 95 per cent ethanol	100 cc.
Glacial acetic acid	10 cc.

Examination of Microstructure

The chief structural features in commercial magnesium alloys that are studied under the microscope are the massive $Mg_{17}Al_{12}$ compound, the precipitated compound, microporosity, burning voids, grain size, manganese and the silicon compound. Their microscopic appearance is described below.

ALUMINUM: Aluminum is the chief alloying constituent in the magnesium alloys. It forms a eutectic network consisting of the compound $Mg_{17}Al_{12}$ and the αMg solid solution.

ZINC: When present, zinc is always added in conjunction with aluminum and has no effect on the identity of the phases present. It does, however,

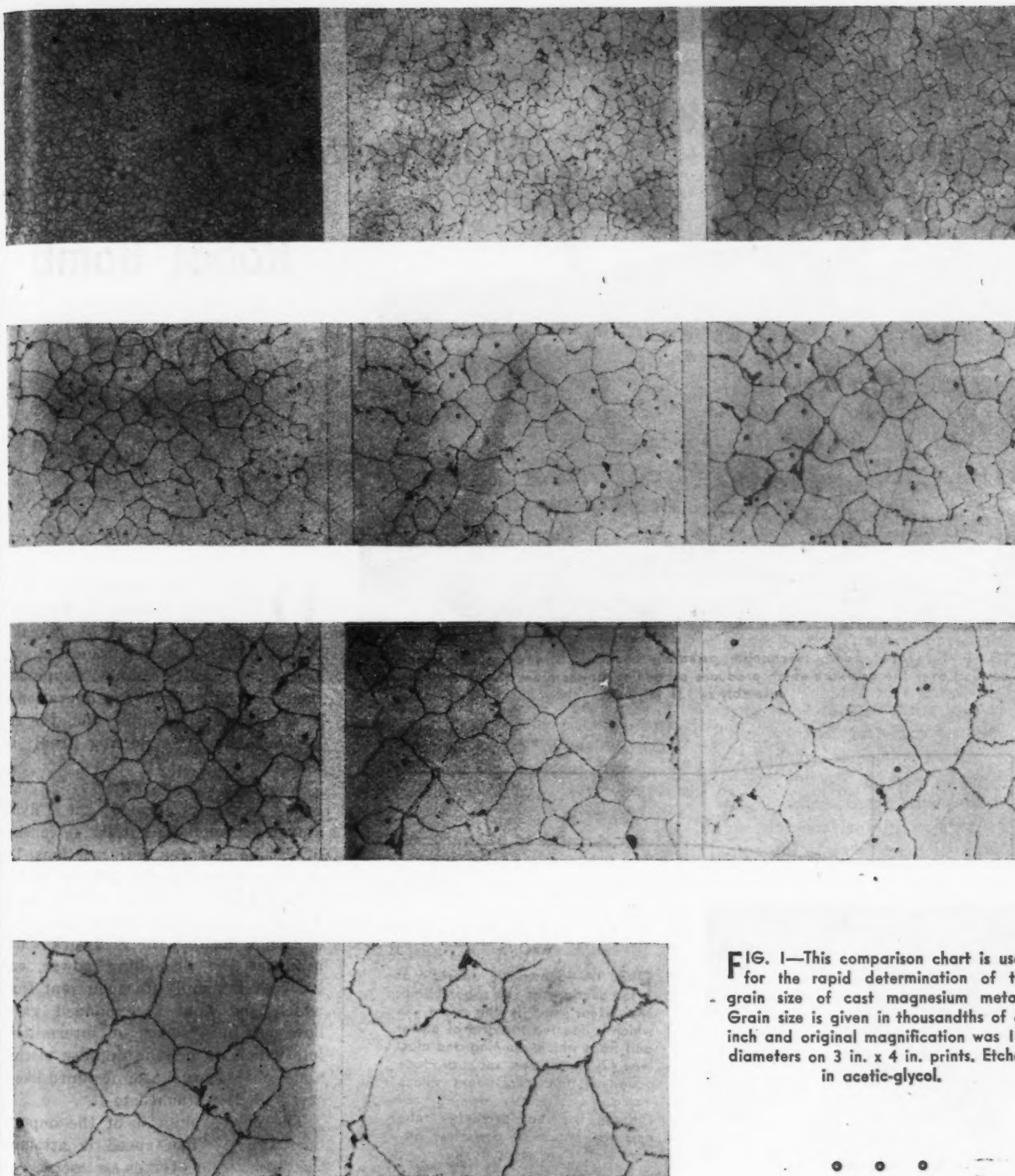


FIG. 1—This comparison chart is used for the rapid determination of the grain size of cast magnesium metals. Grain size is given in thousandths of an inch and original magnification was 100 diameters on 3 in. x 4 in. prints. Etched in acetic-glycol.

change the appearance of the eutectic by making it a so-called "divorced" eutectic with the massive compound surrounded by the α Mg phases.

MANGANESE: To increase the corrosion resistance of magnesium alloys to salt water, manganese is added. It appears in the microstructure as irregularly shaped bluish-gray primary crystals. The solubility of manganese is greatly diminished in magnesium by the addition of aluminum. Therefore, more primary crystals can be seen in the magnesium-aluminum-manganese

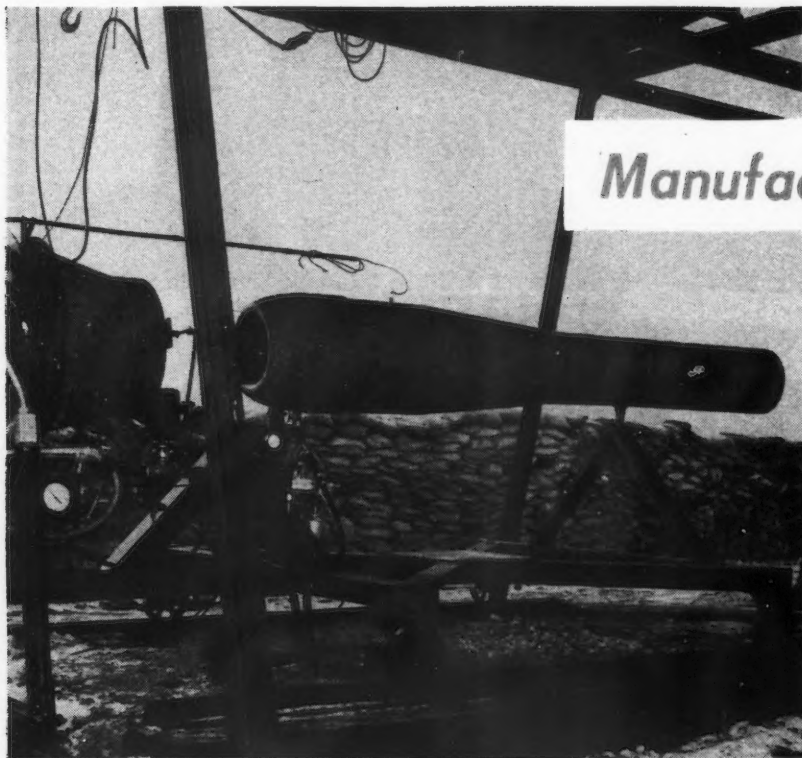
alloys than in the binary alloys even though the manganese content is much higher in the latter.

SILICON: Silicon forms the Mg₂Si compound in the magnesium alloys. This can be distinguished from the manganese by its brighter blue color and in that it polishes less in relief.

POROSITY AND BURNING: Microporosity and burning voids have a similar appearance under the microscope. Both appear as voids at the grain boundaries. However, voids produced by burning during improper

heat treatment tend to have smooth concave sides with sharp points extending along the grain boundaries while those of microporosity tend to have an irregular outline.

The grain size of magnesium alloys can be determined by any of the usual methods or, for more rapid results, can be estimated by comparison with a grain size chart like that shown in Fig. 1. For convenience in reporting grain sizes, whole numbers are substituted for thousandths of an inch in the comparison chart.

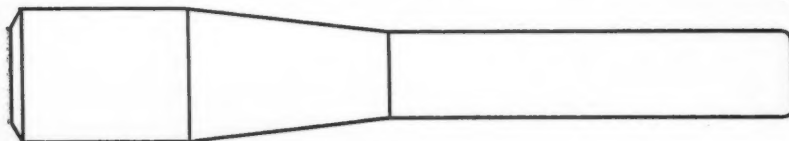


Manufacture Of

Robot Bomb Engines

By S. H. BRAMS

FIG. 1—The robot bomb mechanism assembly is shown here on a test stand. A cowling over the gridwork which produces propelling power hides the grid itself. The assembly is 131 in. long.



ABOVE

FIG. 1A—Schematic diagram of the sections of the robot bomb. The wider end is the front, in which is inserted the grid of plates and flaps which, opening and closing 42 times per sec., produce equally as many explosions, whose expended gases flowing out through the rear drive the tube and the otherwise powerless aircraft attached to it.

o o o

LEFT

FIG. 2—Shown is one of the flapper plates. When air pressure impinges on these at the front the spring flaps are forced against the base, admitting air. When the explosion takes place, the flaps are driven closed in a tightly closed "V" series which leaves the expended gas no egress except at the rear.

o o o



DETAILS of manufacture of robot bomb engines at Ford Motor Co. can now be revealed. Disclosure of these manufacturing methods on the German V-1 type buzz bomb indicates that the operation is a comparatively simple one, the end product alone reflecting real ingenuity.

The buzz bomb, Figs. 1, 1A, has been jocularly termed the "flying stovepipe," and that it is. It consists of a tube of three main sections, 131 in. long, tapering through the middle section from a diameter of 22½ in. to one of 15½ in. In the wider, front section is located the gridwork which produces the propelling power, and the rear is simply an open vent from which the heated, expanded gases flow out in a series of intermittent jets which propel the impulse mechanism and the warhead, designed like a small plane, attached to it.

The power plant is of the impulse duct type. When speed is attained, the airstream forces a series of spring flaps open and builds up pressure behind them. Fuel is then introduced and ignited by the heat of the pressure; the flaps are closed by the explosions, and the vapor streams out of the rear in a sheet of flame about 4 ft. long. The device is started with a blast of spark-ignited compressed air, but once in operation the entire mechanism is automatic and sparkless.

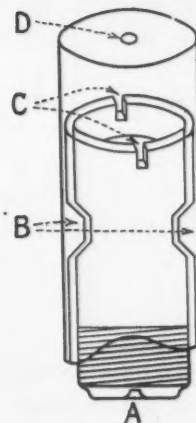
The one complicated component of the mechanism of the buzz bomb itself is the waffle grid at the front. This is composed of 15 grid bars, die-cast of aluminum in permanent molds, and 16 flapper plates, Fig. 2,



LEFT
FIG. 3—The flapper plates and grid plates between them are assembled on this simple jig.

RIGHT

FIG. 5—Nine jets like this one feed fuel to the venturi in which explosions take place. Fuel enters at "A", flows through the center of the inner tube and out through the milled cuts at "B". The fuel moves up between the inner and outer tubes and into the upper chamber through slots "C", which are milled in at an angle to whirl the gas clockwise as it enters the chamber and shoots out through aperture "D" of the outer tube into the venturi. In actual operation, much less space is present between the tops of the two tubes, reducing the flow area between chamber and aperture.



ordinary open-hearth low-carbon steel in thickness of 0.109 in. Rolled circular, these plates are brought to the jet bomb manufacturing plant, and there welded into a tube with 3/16 in. carbon welding rod in a seam 69 in. long. Meanwhile, similarly, the tapered funnel section, in the center, is welded lengthwise, as is the combustion chamber itself near the fore end of the mechanism. These sections are then welded to each other. In all, there is 131 in. of longitudinal seam weld, about 307 in. of welding joining the various sections, 68 in. of other seam welding, 40 in. of acetylene welding and 38 spots.

A word should be said for the fuel jets, Fig. 5. These, like other portions of the grid section, are held within 0.001 in. on all fitting dimensions. Gasoline is fed through manifolding to the jet tubes, which end in two slots which are milled obliquely across the end, leading to a chamber and outlet hole. The high speed of

the spray results in the gas flowing in a circular motion, to produce most effective combustion, around the chamber and through the hole into venturi. A metering device which is built into the warhead adjoining the fuel supply functions automatically to feed the jets in quantities balanced with the supply of air obtained at different heights.

The general public impression has been that the buzz bombs are purely an implement of war, but Ford engineers and others think differently. They are such an effective propellant—producing an estimated 3 hp. for each pound of the more than 300 lb. weight—that they have stimulated the imagination of transportation engineers everywhere. They are being thought of as a propellant means for aircraft, marine vessels and automobiles. The principle of the impulse duct engine borne as a desperate war measure in the minds of German engineers may find its fullest destiny as an instrument of peace.

alternately set into place, Fig. 3. Three of the grid bars each carry three fuel jets. The flapper plates, approximately 15 in. long, are riveted to their supporting bars and are of ordinary spring steel.

Having been assembled, these are mounted into a grid holder which in turn is welded into place at the front of the tube. Before this, however, other welding operations have taken place.

The first of this series of welds is on the tailpipe, Fig. 4, rolled from

FIG. 4—The rolled sheet for the tail plate is slipped over this fixture, which automatically feeds the seam past the welding operator as it holds the work in position. Hand welding is presently being done, but as the attachment at right indicates, automatic submerged melt welding may later be substituted.



Plated Plastics

By STANLEY H. BRAMS

... Already established, plated plastics have some interesting postwar possibilities. While cost factors are usually higher than for plated metals, there are some compensating advantages, including resistance to corrosion. Data on physical properties are included in this review.

PLATED plastics are something new in the fields of metal and synthetics. They are just what their name implies—plastics, usually thermosetting, which have been coated with any of the electrolytic metals. There are two advantages. On the practical side the finished structure has acquired, by virtue of its plating, a proportion of the physical attributes of a metal product, combined with the light weight of plastics. On the decorative side, plated plastics can combine the brilliant color which can be achieved with synthetics together with the gleam of metal.

The use of plated plastics is already becoming notable in costume jewelry and related fields, Figs. 1 and 2. Plated plastic buttons are on sale in New York shops and elsewhere. Plated plastic caps adorn perfume bottles. On a more utilitarian level, war plants are employing plated plastics in many roles—among others, lead platings as shields for radio equipment to be used in aircraft where lightness is a prime desirability, and copper platings where conductivity is desired.

In the postwar world it is entirely possible that plated plastics will be

widely employed for home and automotive hardware, for decorative effect on electrical appliances wherein weight saving is desired, and in many other directions. That the field is barely explored at this time is well indicated by efforts currently being made by some eastern firms to achieve the effect of a spirally wound wire used as an electric coil by plating metal over a plastic base, then grooving the metal in a tight helix, the open spaces made by the grooves acting to separate the original sheet of metal and leave it as a coil, solidly bonded to the base. Applications of this sort, while they may not prove feasible, aptly indicate in how many directions the development may move.

An important push for plated plastics conceivably might occur in the automobile industry if there develops the scarcity of die casting facilities expected by some passenger car company executives. Should die casting plants be tied up on war work to the end of the Japanese war, well past the resumption of automobile production, it is quite possible that the car makers will turn to plated plastics as the solution for their interior hardware fittings, where appearance is all important and where strength (and then only limited strength) is required on comparatively few items, such as door handles. A situation of this sort

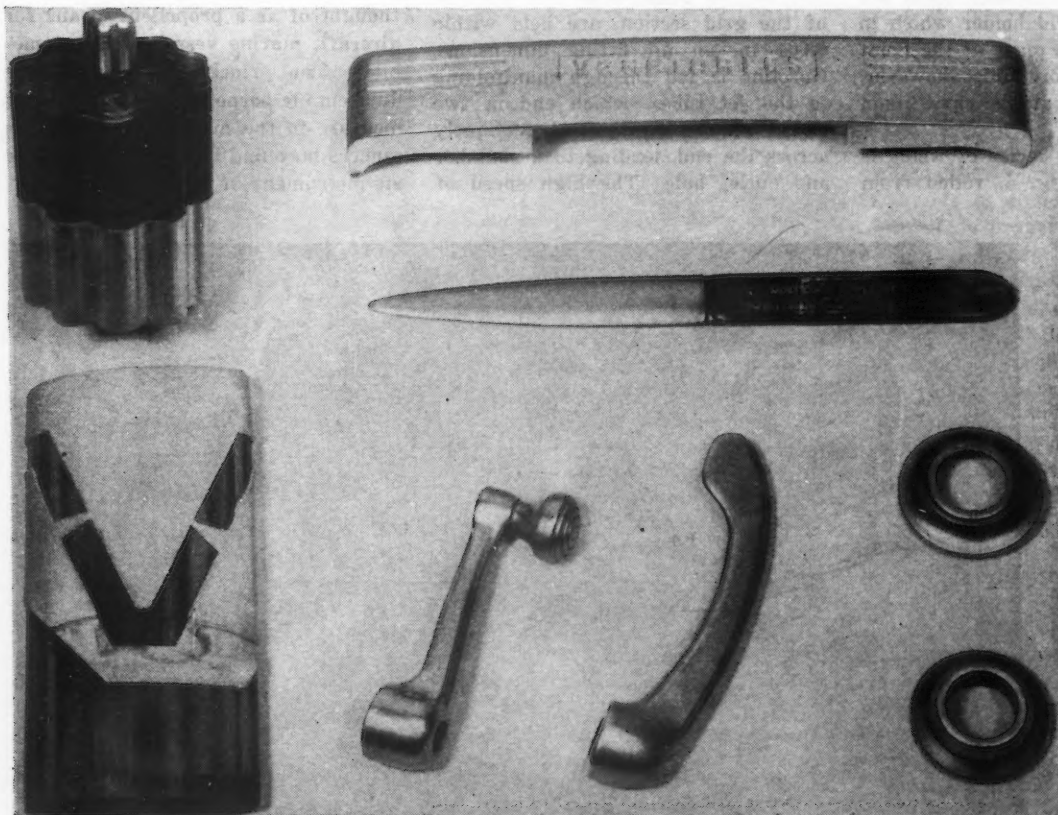


FIG. 1—Products for a variety of uses are shown. The base and cap of the mottled plastic cigaret box are plated with copper, buffed, then flash plated in gold. Lower right is a section of an aircraft antenna mast of impregnated wood, copper plated about 0.013 in. deep except over the base. The specified plating area actually ends with the solid "V" section; excess copper has bled out through the channels beyond the unplated wood, preventing build-up on the edges of the solid section, and is later stripped off. Upper right is a refrigerator door handle with copper base, nickel plated and flash chromed. The knife section of the nitrocellulose letter opener is copper plated, buffed, then nickel plated. The doorhandle and window regulator are copper, nickel and chrome plated, in that order, as are the cellulose acetate escutcheon rings.

might well be the starting point for use of plated plastics on a substantial scale.

Cost Factors

One great stumbling block for plastics, as for ordinary plastics which seek to replace metal, lies in cost. The plastic base of any plated product is necessarily more expensive than a core of iron, steel, aluminum, or magnesium. In automotive applications, where costs are figured in fractions of pennies, this may prove fatal. In decorative and luxury applications, of course, weight savings which increase the appeal of the product for overbalance higher costs.

But places may exist where the cost of plating plastics saves an operation and thereby justifies itself. An example lies in an investigation now being undertaken by an aluminum casting producer. Aluminum castings (like others for that matter) come out of the mold rough and must be machined before plating. The investigation currently in progress is to determine the feasibility of simply coating this product with plastic to a thickness of 0.010 in. or so, then plating the plastic. The investigation is to determine whether the cost of plastic-coating, then metallizing, the plastic, is comparable with the cost of machining, then plating metal to metal. Experimental work of this sort calls to mind the tendency of some metals to oxidize in air; this obstacle to use might be overcome by the same sort of metallized plastic covering.

Practically all types of plastics can be metallized, although of course the electroplater prefers to work on the thermosetting plastics because of their greater stability. One point for the plastic fabricator to remember is that plastic objects intended for plating should be designed with that objective in mind. Grooves out into the plastic will not plate too well; the surface within the groove is cloudy in comparison to the rest of the surface. Very fine detail will naturally be lost in plating of any depth.

Of the five methods generally employed for applying metal to a non-metallic base, silvering is one of the older ones. This method is the basis

For a comprehensive discussion of the general subject of "How to Plate Metals on Non-Metals," see two articles under that title by Adolph Bregman in THE IRON AGE, June 12, 1941, page 51 and June 19, 1941, page 46. Plating on plastics, and the methods for so doing are treated in detail by Mr. Bregman.

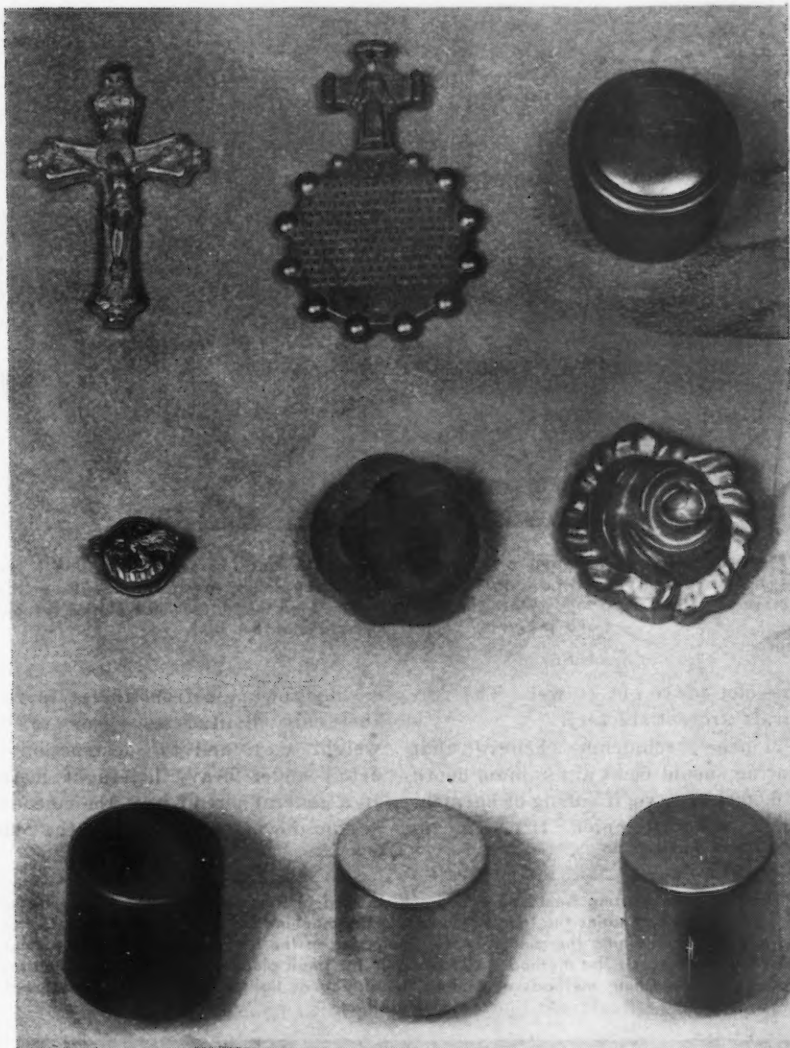


FIG. 2—The range of personal applications for metallized plastics is indicated by this plate. Left to right, top row, a crucifix, religious medal and light switch. The religious articles, both cellulose acetate which has been roughened by mild sand blast, are flash silver or gold plated over the bond, whose application precedes plating in all instances. The light switch is plated with copper, nickel and chrome. Second row, left, is the national service discharge button (copper, flash gold plated); a Lucite ornamental button ready for plating; and another button of different after silvering, darkening with sulphide then plating and burnishing. Lower row comprises three bottle caps, each copper plated 0.003 in. deep over the bonding coat. Left cap has simply been buffed. Center cap was silver plated and buffed. Right cap was flash gold plated, then buffed.

of patents held by the Metaplast Corp. of New York City, which has licensed Monroe Auto Equipment Co., Monroe, Mich., for exclusive production in the automotive field and for output in any other fields it chooses to enter. With this commitment, the Monroe concern is moving in development and production about as aggressively as anyone else in the country, operating a small but adequate plant at this time and contemplating extensive growth as soon as changed conditions permit.

The Metaplast process calls for silvering by reduction in the presence of a No. 1 solution consisting of tin and hydrochloric acid. This furnishes a tight bond to the plastic, on which

electroplating in the orthodox manner can then proceed, Figs. 3, 4. Monroe has plated all of the common metals on plastics, including tin, silver, gold, nickel, cadmium, zinc, copper, and chromium, and could readily do rhodium, lead and palladium if the need arose. Plating in all cases is by ordinary electrodeposition except in the case of gold, where for economy reasons a patented gold solution is employed. Chrome, cadmium and zinc are naturally the most widely used plating materials.

Monroe has found that certain plastics lend themselves much more readily to plating than others. Lucite, Bakelite, Plaskon and the butyrates are especially good. The vinyl group



FIG. 3—Irregularly shaped articles are loaded into mesh baskets for plating. The baskets are suspended from an eccentric actuated by a slow speed motor. The gentle movement thus imparted to the basket and its contents distributes the plating evenly and prevents "pocket" formations in the tank.

does not prove out so well. The furlings are satisfactory.

Monroe technicians believe that plating should be at a minimum depth of 0.0003 in. or so, if buffing or burnishing is to be attempted. It can go up

to any thickness from there; in fact the only limitations seem to be weight, cost, and the destruction of detail under heavy layers of metal. In a general sort of way, the rule may be laid down that the nearer the plat-

FIG. 4—After plating, small objects are lacquered in this centrifuge. The solid metal basket, which contains the lacquer, lowers in the machine column to accommodate the wire basket, containing the pieces. After immersion in the lacquer, the pieces are spun and freed of excess. This method is suitable only for small pieces. Lacquering, of course, follows such finishing methods as buffing, burnishing or light sand blasting to achieve a satiny effect.



Table I
Comparison Between Plated and Non-Plated Plastics

Specimen	Tensile Strength, Lb. Per Sq. In.	
	Plated	Unplated
Phenol formaldehyde.....	8,550	8,075
Phenol formaldehyde.....	9,350	8,300
Urea formaldehyde.....	10,450	8,050
Polystyrene.....	4,225	3,038
Methyl methacrylate.....	11,575	10,708
Cellulose acetate.....	4,825	4,213
Phenol formaldehyde.....	8,450	5,675

Findings are averages of two specimens.
Plating: Copper, 0.0025 in., cadmium, 0.0005 in.

ing is to minimum thickness, the better.

Buffing is employed for finishing some of the products of this company. Depending on their character, others are burnished in tumblers with steel shot. In this respect, as in many others, the techniques of plating are parallel with those in ordinary finishing of metal, once the metallic bond has been applied.

Having always operated in a field where specifications and complete information on the product are absolute necessities, Monroe has lost little time in determining the physical attributes of plated plastics. Its findings on tensile strength, corrosion, absorption, impact strength, and others document the field in very interesting fashion.

Indicative of tensile strength achieved by thin coatings of copper on plastics are the findings shown on five samples in Table I. Rectangular strips were employed for these tests.

In another series of examinations undertaken by Monroe, corrosion progress on plated plastic and plated metal products was compared. As is generally known, metal coated die castings, finished in successive layers of copper, nickel and flash chrome, begin to rust at the base metal; the

Table II
Water Absorption of Plated Plastics

Specimens	Water Absorption in 24 Hr. Percentage of Weight	
	Plated	Unplated
Phenol formaldehyde.....	0.095	0.460
Phenol formaldehyde.....	0.070	0.380
Urea formaldehyde.....	0.060	0.450
Polystyrene.....	0.020	0.060
Methyl methacrylate.....	0.010	0.240
Cellulose acetate.....	0.070	2.150
Phenol formaldehyde.....	0.120	0.620

Findings are averages of two specimens.
Plating: Copper - cadmium, as in Table I.

rust starts underneath the base coating of copper and works out toward the surface, spreading as it grows and resulting in flaking. With plastics, however, the base material itself is non-corrosive and therefore failure cannot start under the surface. Where a plated plastic fails under salt spray no rust spot develops; the surface simply wears away as in erosion.

One important advantage of plated plastics over unplated plastics is the greater resistance to water absorption. Many plastics, particularly those in the cellulosic group, absorb water, oils and solvent to the extent that their efficient use is impaired.

Table III
Impact Strength of Plated Plastics

Specimens	Notched Izod Value Ft.-Lb.	
	Plated	Unplated
Phenol formaldehyde.....	0.430	0.335
Phenol formaldehyde.....	0.430	0.320
Urea formaldehyde.....	0.350	0.295
Polystyrene.....	0.365	0.240
Methyl methacrylate.....	0.365	0.355
Cellulose acetate.....	2.705	2.290
Phenol formaldehyde.....	0.480	0.330

Findings are averages of two specimens.
Plating: Copper - cadmium, as in Table I.

Testing in Monroe's laboratories established that a cellulose acetate sheet which absorbed 2.6 per cent of water by weight in 24 hr. absorbed no water in that same length of time after plating. Other findings on water absorption are shown in Table II.

The high impact strength of phenolics has widened the use field of the plastic industry, but sometimes even better showings are desired. Plating, adding a definitely minor amount of weight, develops increases of 10 to 20 per cent in impact strength on high impact phenolics. Findings on this subject are shown in Table III.

Chromate Gasketing Developed for Duct Work

CHROMATE gasketing was originally developed as a substitute for low pressure rubber gaskets and gasketing materials to be used for sealing and packing joints in air ventilator lines, forced draft blowers, etc., on naval and merchant ships. Because of several improvement features it possesses, its use has since spread to other aspects of sheet metal and piping system construction. It is a product of the Sherwin-Williams Co., Cleveland.

Formerly, where resistance to air pressures up to about 10 lb. per sq. in. was required, sponge rubber was usually employed, either in molded form or in forms cut from sheeting, although rubber gaskets did lack adequate heat and flame resistance. Chromate gasketing, on the other hand, is flame and fire resistant to a high degree, thereby rendering it valuable for use on ships where inflammable materials must be avoided. Another advantage is its ability to withstand relatively prolonged exposure to salt water without decomposition and disintegration. It also has the advantage of being either factory pre-cut or cut from sheet at the point of use without special tools. As such it represents a definite improvement in ship fabrication procedure.

Chromate gasketing employs as a base sheet material a good grade of low shoddy content wool felt. The felt base is impregnated with a chromate pigmented compound which is non-drying, tacky and water insoluble and renders the felt flexible, pressure resistant and flame resistant. Close control of the amount of pigment absorbed results in a gasketing material which possesses a compressibility

ratio ranging from 40 to 65 per cent.

A chromate gasket will maintain air pressures up to 25 lb. per sq. in. at normal temperatures. It will not show any decomposition or disintegration after a 10-day immersion in sea water or a 10 per cent salt solution, except for whitening or lightening in color due to the normal reaction of the anti-corrosive pigment. In addition to fire and flame resistance, it is not affected by fuels and has definite rust inhibiting properties. Chromate gasketing is dark green in color and

is available in two thicknesses— $\frac{1}{8}$ and $\frac{1}{16}$ in.

While its original application was the sealing of joints in air ventilator lines, forced draft blowers and similar equipment, many more uses have been demonstrated, such as flange-to-flange joints in water and oil systems and flange connections to structures for similar service.

Chromate gasketing has been approved for water tightness and fire resistance by the U. S. Navy Bureau of Ships and the Maritime Commission.

NINE different types of sheet metal piping and duct joints, all insulated with chromate gasketing. This waterproof and flame resistant seal has gained wide acceptance in the shipbuilding industry.

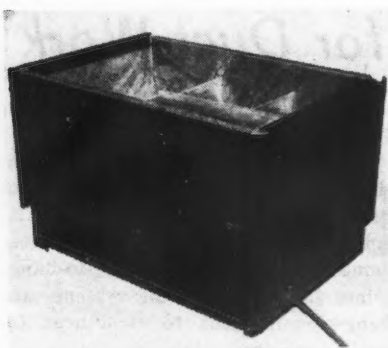


New Equipment . . .

Finishing

... Recent developments in cleaning and drying equipment, plating accessories, chemical coatings and other finishes are described in the following pages.

A THREE stage metal washing tank designed for use with an emulsifying cleaner or as an alkali washer has been announced by *Phil-*



lips Mfg. Co., 3401 West Touhy Avenue, Chicago 45. It consists of a heated solvent tank and two heated water rinse tanks. The solvent tank offers a thermostatically controlled range from 135 to 250 deg. F. and a drain board which conducts the "dragout" solvent back into its tank. After immersion in the cleaning agent and draining, the parts are immersed in the first, then the second rinse tanks, emerging completely oil and dirt free. The water rinse is also heated with a controlled flow that keeps the temperature at about 180 deg. F.

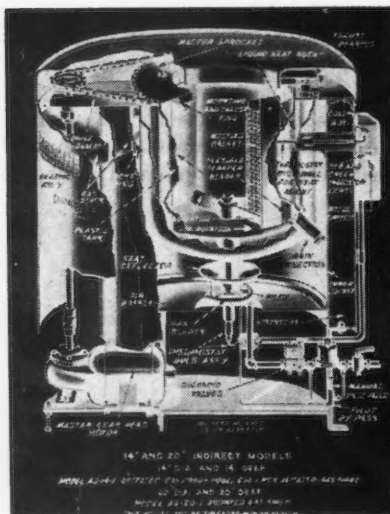
Drying Oven

A STANDARD box-type oven for the high-speed evaporation drying of highly volatile solvents has been developed by *Industrial Oven Engineering Co.*, 11621 Detroit Avenue, Cleveland. It is a self-contained unit with all heating equipment and ductwork built into the oven shell and is shipped either assembled or in prefabricated sections for assembly. The temperature range is from 150 to 900 deg. F. with a tolerance of ± 2 deg. These ovens can be used not only for alcohol but for acetone, naphthas, methyl-ethyl-ketone and many other highly volatile solvents and can also be converted for other types of dry-

ing, finishing, heat treating or heat processing where material can be handled in trays, jigs or baskets. It is especially suited to dense loads where air stream resistance is high. Completely automatic controls, of the expansion recording thermometer type or the millivoltmeter type, either air or electrically operated, are available.

Plastic Dip Tanks

DESIGNED about the principles of either direct or indirect heating, with a choice of either gas or



electricity as the heating medium, processing equipment with specific application to hot dip plastic packaging has been announced by *Castaloy Metal Sales Co.*, 197 South Waterman Avenue, Detroit 17. Called the Castaloy Dowtherm vapor system, the indirect heating unit employs Dowtherm E vapor which provides quick uniform heat with very close temperature control, assuring a minimum degree of degradation of the molten plastic. The vapor system is hermetically sealed and no pumps are required to circulate the vapor. To accommodate automatic dipping of parts, a constant level feature maintained by an air driven impeller type pump is supplied.

Spray Booth Protective Coating

A PROTECTIVE coating, Triad PR, for the sidewalls of both wet and dry spray booths has been announced by *Detrex Corp.*, 13005 Hillview Avenue, Detroit 27. The booth so protected is stripped clean simply by spraying with water or steam. The coating and the accumulated paint flush off together. In dry booths which have no drainage facilities, the protective coating facilitates scraping off the paint.

Plating Tape

FOR the insulation of plating racks and for masking parts before selective plating, a tape has been developed by *Michigan Chrome & Chemical Co.*, 6340 East Jefferson Avenue, Detroit. Known as the Microtape, it is the first product of its kind to be produced by an extruding process. This results in a slightly curved surface which feathers out to uniformly light edges, making the tape extremely easy to apply and permitting smooth overlapping and a snug fit around every surface. The tape can be built up into any desired thickness and by



heating for an hour at approximately 300 deg. F. will fuse into an integral coating. The tape is said to have practically all the physical characteristics of rubber but to surpass its chemical resistance.



Electrolytic Brush

An electrolytic brush used for electroplating compounds has been announced by *Warner Electric Co.*, 663 N. Wells Street, Chicago 10. Immovable objects can be electroplated without being dismantled. The conductivity of electric switch contacts blades and jacks can be improved or renewed without disassembly. Dies and shafts can also be plated and renewed when worn. The compounds are available in gold, silver, nickel, copper, cadmium and chromium.

Plating Thickness Determinator

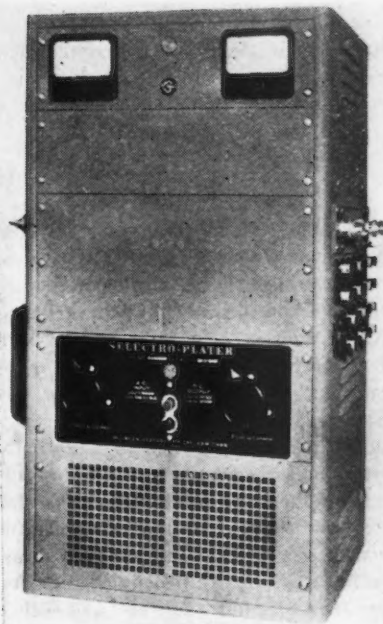
FOR determining the thickness of cadmium, zinc, copper and tin deposits, an automatic dropping unit, which embodies the principles of the Hull & Strausser drop test without the necessity of regulating the dropping rate as it is delivered to fix 100 drops per min., has been developed by *Kocour Co.*, 4724 South Christiana Avenue, Chicago 32. A counter indicates the number of seconds elapsed before the plate is penetrated. An adjustable arm fastened to the side of the cabinet holds the dropping tip in the desired position.

Organic Type Cleaner

An organic type cleaner, Pennsalt Cleaner EC-10, has been developed by *Pennsylvania Salt Mfg. Co.*, 1000 Widener Bldg., Philadelphia 7. It is especially adapted for the removal of drawing compounds or cutting oils in a single operation.

Multi-rectifier

ALLOWING for a range of from 0 to 48 volts and 100 to 18 amp. in a compact mechanism, a multi-rectifier has been developed by *Green Electric Laboratories*, 130 Cedar Street, New York 6. It incorporates six selenium rectifier sections which may be interconnected by external links to provide four ranges of d.c. power. On each side of the cabinet, wing nut terminals are duplicated for convenience in connecting loads. The section binding posts for interconnection are externally located on the right hand side only. The multi-rectifier is available for operation from 220 to 440 volts or as specified, at 60 cycles.



Abrasive Cloth

ANON-METALLIC abrasive cloth for smoothing or resurfacing wood, metal and other surface areas, for removing accumulations of grease or metal filings around machinery areas, for removing heavy soil or grease from the hands, etc., has been developed by *Downy Products Co.*, 555 Central Avenue, Orange, N. J. Downy abrasive facing comes in several standard types and sizes. It is made of a non-metallic abrasive "anchored" to an absorbent terry cloth foundation by a plastic binder.

Metal Cleaner

AWATER soluble metal cleaner, Swirt, has been developed by *Phillips Chemical Co.*, 3401 West Touhy Avenue, Chicago 45. The

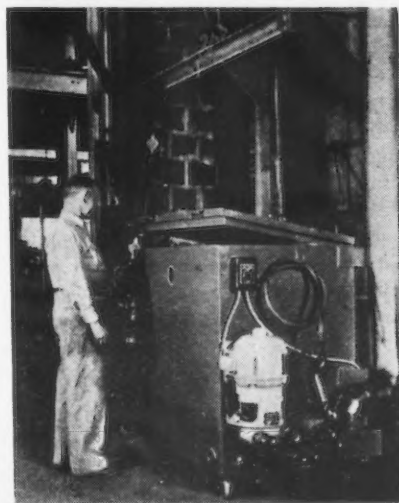
cleaner acts upon grease, buffing compounds, cutting and machining coolants and oils and is equally as effective upon ferrous and non-ferrous metals. It is practically odorless, is neither acid nor alkaline and consequently will not etch or pit and can be used on the most sensitive metals and alloys, it is claimed.

Rust Solvent

CARBORUSTEX, a rust solvent, has been announced by *Carbozite Corp.*, First National Bank Bldg., Pittsburgh 22. The solvent which is non-inflammable has an affinity for rust itself but will not attack the unoxidized metal, it is claimed. Surfaces treated with the solvent remain chemically clean but are quite vulnerable to oxidation. With shipments of the solvent, therefore, a sufficient quantity of a chemical rust inhibitor which is dissolved in water is furnished. After the rust has been removed, this rust inhibitor will protect the surface from oxidation for several days until the surface can be permanently coated with a protective coating.

Metal Cleaning Equipment

ABATCH spray type cleaning machine especially adapted to the cleaning of large, heavy parts has been announced by *Optimus Equipment Co.*, Matawan, N. J. The machine is portable and uses any cleaner. As it is operated closed, there are no fumes or unpleasant odors. The work is washed and rinsed in the same compartment but the waste water drains into the sewer and does not contaminate the solution. It is adaptable to any low cost, convenient heating system with optional thermostatic control and insulation. The parts are handled by an overhead track and



carriage and are lowered on a flat grille. Hot or cold solution is pumped through the spray nozzles fastened on rocking frames so as to reach all surfaces of the work. The company is also offering a standard dip cleaning machine.

Adjustable Spraying Nozzle

AN adjustable spraying nozzle which because of a new ball and socket design provides a full 50 deg. nozzle adjustment range in any plane at right angles to the face of the joint has been announced by *Spraying Systems Co.*, 4021-P West Lake Street, Chicago 24. Thick socket plates permit an unusually strong friction grip, more than sufficient to hold the nozzle in fixed position, no matter how extreme the spraying operation. Three machine screws are quickly turned to adjust the joint as required. The joint is made in brass or steel as required but may be had in a variety of special steel alloys as required. Various sizes of joints with standard pipe thread are available, such as $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$ and 1 in.

Steam Jet

A STEAM jet for pickling tanks and water rinse tanks has been announced by *Youngstown Welding & Engineering Co.*, Youngstown, Ohio. The jet is a combination mixer and agitator. Steam comes forth at high velocity from a special nozzle of the jet. On emerging from the nozzle at high speed, the steam expands into a bell-shaped housing, creating a strong suction at the rear of the bell. The rear end of the jet being open permits this suction to draw the solution from the corner in back of the jet and the suction creates an incoming current which circulates from the side of the jet. Power generated by the steam swishing forth into the solution in a broadening diameter circulates the pickling liquid forward and around a pickling tank in a continuous cycle. Under this flow of steam power the pickling acid is heated and agitated. Made of Monel, the jet was primarily designed for sulphuric acid pickling solutions. For special applications the jets are available in stainless steel, nickel, Inconel or any weldable material.

Dry Tumbling Machine

A MACHINE for dry tumbling has been announced by *Lewis Roe Mfg. Co.*, 1050 De Kalb Avenue, Brooklyn, 21. The machine has an

octagonal hard wood barrel, 14 in. in diameter and 24 in. long with a partition in the center and is mounted on an iron stand. It has a $\frac{1}{4}$ hp. 110 volt a.c. motor with a speed reducer to drive the machine at 40 r.p.m. or any speed that is required.

Blackening Finish

ACHEMICAL blackening finish for ferrous parts, Ferrotone, has been developed by *Turco Products, Inc.*, 6135 South Central Avenue, Los Angeles 1, Calif. The bath operates at a temperature considerably below that required by oxide finishing baths. It is claimed that the finish does not chip, flake or peel off even under repeated flexing. It will not blister and cannot be removed under routine cleaning operations by the action of solvents or degreasing agents. The Ferrotone process neither increases nor decreases the dimensions of the treated metal.

Synthetic Rubber Primer

CLAIMED to offer most of the characteristics of chlorinated rubber, a synthetic, Chlorinated Isopol, available in metal primer formulations and in powder form has been developed by *Union Bay State Chemical Co., Rubber Chemicals Div.*, 50 Harvard Street, Cambridge 42. Suggested uses are as a primer for rubber-to-metal adhesion, as an ingredient in adhesives, paints, lacquers, inks, etc., as an acid and alkali-resistant coating for metal, concrete and other surfaces, for fire-proofing and for moisture-proofing fabrics and other materials, wherever sound and heat insulation qualities are desired and as a plastic wherever inertness to chemicals and fire-proofness are of importance.

Rust Preventive

ARUST preventive, Kendall Rust Preventive 5, which combines wax concentrates in solution with petroleum solvents, has been announced by *Kendall Refining Co.*, Bradford, Pa. The preventive is said to be water repellent, to withstand seashore exposure tests and to stand up in the laboratory under ultra violet light, humidity cabinet and salt spray cabinet tests with low temperature characteristics which required ductility at temperatures as low as minus 20 deg. Drying time is claimed to be well under one hour and it is easily removed by any petroleum solvent or kerosene.

Colored Protective Coatings

IRIDITE, the process for rendering zinc and cadmium surfaces highly corrosion-resistant, has been developed in several new colors, blue, green, bronze and blue-black according to an announcement by *Rheem Research Products, Inc.*, 2523 Pennsylvania Avenue, Baltimore 17. With the exception of the bronze, all colors are applied by dipping, one dip for the basic coating and a second dip in the dye-bath. Iridite bronze is a one dip basic coating. Because the basic Iridite coating possesses excellent qualities as a paint base, the new Iridite colors can be clear-lacquered for even greater durability.

Ceramic Coating

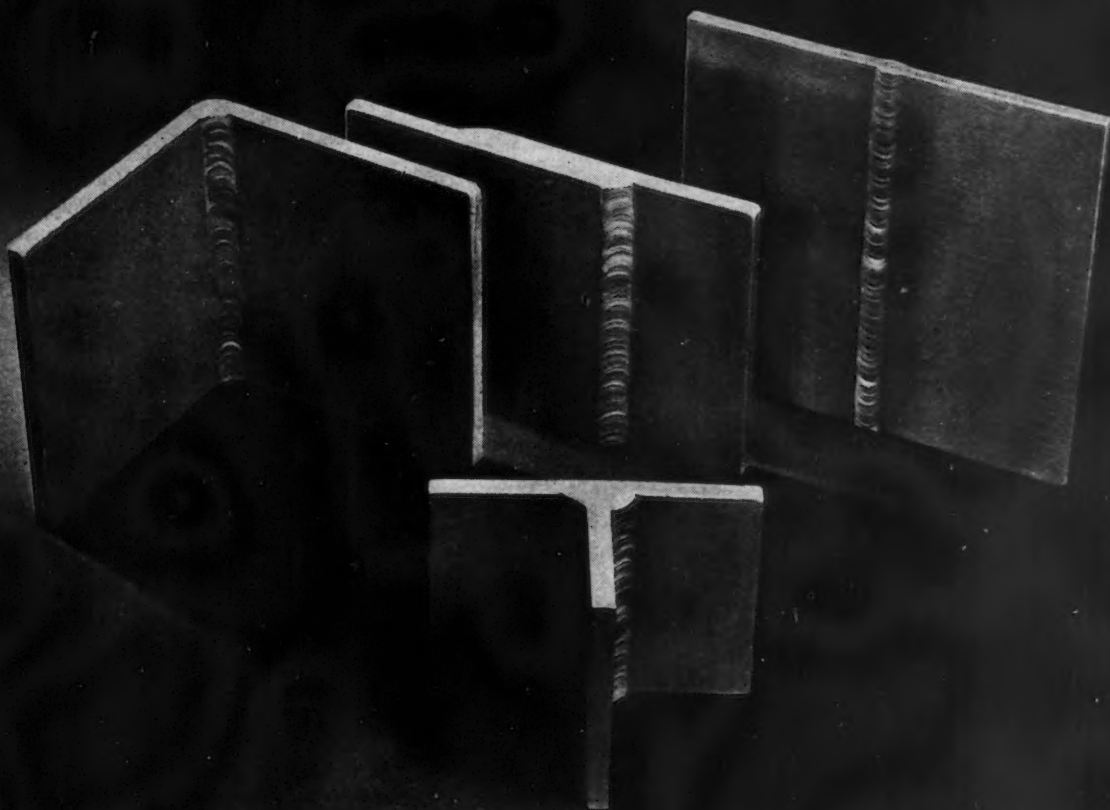
FOR control of wavelengths of Infra-red lamps by a ceramic coating, Penetrax has been developed by *Verd-A-Ray Corp.*, Toledo. More intensive color, better curing and superior polymerization on metals are claimed for its improved wavelength. The amber coating reduces glare and also reduces attraction to insects insuring clean work. Lower lamp base temperature is another feature of the coating. Penetrax is employed to heat the exhaust cylinders, thus insuring a more nearly perfect vacuum by absorption of moisture and residual gases generally not otherwise removed.

Rust Resisting Paint

AHIGH heat resisting paint has been announced by *Kuigley Co., Inc.*, 527 Fifth Avenue, New York 17. On light steel it will adhere under rapid heating and cooling up to 1400 deg. F. On alloy steel, brick, etc., it will stand 2500 deg. F. or over. It is non-inflammable, non-irritating and does not give off fumes or odors when applied, upon drying, or when subjected to heat or flame.

Polishing Wheel Cement

ASYNTHETIC polishing wheel cement, Gripmaster has been developed by *Michigan Bleach & Chemical Co.*, Detroit. Because of a high-heat resisting ingredient, Gripmaster does not glaze on the wheel. Its new adhesive action locks in the grains of emery with positive vise-tight control, it is said. All grain sizes—250 to 20—can be applied with just one grade of cement.



Yes, Magnesium can be welded . . . Easily

Revere magnesium alloys can be successfully joined by any of the conventional methods, such as resistance and fusion welding, bonding cements, rivets, screws, bolts and nuts.

The sections above illustrate some of the fusion welds being made daily with magnesium. The average welder can make uniform, high-quality welds after short practice. The strength of the joint may vary from 70% to 100% of the parent material, depending on the alloy and the welding conditions. All types of joint are possible—lap, butt, tee, corner, fillet and angle. Under proper conditions there is no fire hazard whatever.

Magnesium, the lightest of commercial metals, is freely available today from Revere in several alloys. Through our war work we have gained much valuable experience, and will be glad to work with you on problems in selection, welding, machining, forming, drawing, forging. This cooperation is offered without obligation. Write Revere Executive Offices.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

Executive Offices: 230 Park Ave., New York 17, N.Y.

THE IRON AGE, February 1, 1945—69

Assembly Line . . .

STANLEY H. BRAMS

• Detroit WPB office is seeking assurances of sustained production on new contracts before any are let out . . . The word filters into Detroit that Washington controls will not be relaxed to extent expected earlier.



DETROIT—The War Production Board's decision to determine where war contracts are to be placed coincides with word from the Detroit WPB office that new commitments would continue to be made in this No. 1 labor scarcity area. However, something new has been added—a requirement of assurances that production will be turned out properly and on time.

WPB's regional director, Carsten Tiedeman, said that before any new war contract is placed in Detroit, representatives of the services and civilian war agencies will meet with both management and labor to obtain assurances that all efforts will be made to turn out production on schedule, to eliminate work stoppages, and to increase labor productivity. Unless these assurances are received, Tiedeman said, contracts will be placed in other less stringent manpower areas.

Left unsaid was how these assurances will be implemented, and of course there is no way to guarantee them. Management in the Detroit area has steadily maintained that there is plenty of labor if each worker produced an honest day's output. Labor's stand has been that its people have been turning out that day's work in most instances, but are handicapped in some cases by "reactionary" employer policies. As to strikes, labor's policy is against them, but that position does not prevent them, so assurances that strikes will end have a rather futile sound to them.

What's more, it is dubious whether considerations like these will halt or will speed the placement of contracts in the Detroit area. The reason this area is the nation's arms capital is not because its executives are more aggressive, or its climate more suitable, or its facilities better. The reason lies in the fact that Detroit—meaning the automotive industry—has been able to do the tough jobs better. It's that simple, and it means that the services will continue to have little alternative on contract placements of the near-uncrackable production nuts.

Thus it is that Detroit is producing around 15 per cent of a total billion dollar Navy rocket program. More than 1500 plants in the district on rocket jobs, of which 17 prime contractors including Pontiac, Kelsey-Hayes, McCord, Firestone Steel Products, Monroe Auto Equipment, Nash-Kelvinator, Reo, Durham, McInerney Spring, Motor Wheel and Westinghouse. Schedules on these call for a 300 per cent increase in the next three months.

Last week saw the Area Production Urgency Committee approve about

\$50,000,000 in new contracts in the district, of which one covered 10,000 trucks worth \$33,000,000. More jobs are in process of approval. One such is a new Pontiac Motor Division contract to manufacture large quantities of 5-in. high velocity assault rockets, which will be built and assembled complete except for the nose fuse and the explosive charge.

Farther afield, but still in the automotive sphere, is a new contract obtained by Chrysler Corp. to recondition 4500 Army trucks at its Evansville, Ind., plant. This activity will proceed along lines parallel to the tank reconditioning program begun in that plant last fall. It provides for reconditioning, packing and boxing for overseas shipment Army trucks used in the United States—mostly six-wheel-drive and four-wheel-drive command cars and troop and cargo transports originally built by the Dodge Division.

Possible contract enlargements are also seen for civilian trailers, which utilize considerable sheet and other forms of steel. This anticipation grows out of the fact that the reduced

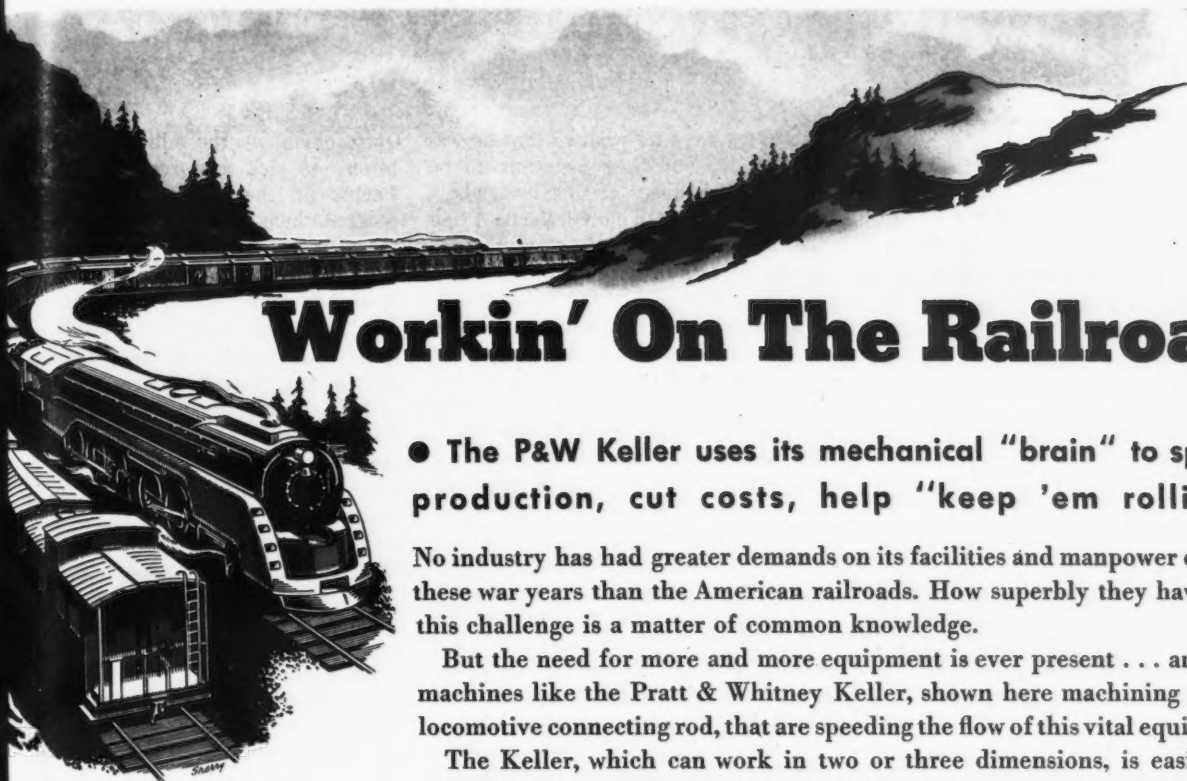
SERVICEMAN'S POST WAR JEEP: Built by Ordnance motor repair mechanics of the Air Forces in England of scrap pile jeeps, this is the latest bid on what to do with the Army scout car after the war.



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Workin' On The Railroad

● The P&W Keller uses its mechanical "brain" to speed production, cut costs, help "keep 'em rolling"

No industry has had greater demands on its facilities and manpower during these war years than the American railroads. How superbly they have met this challenge is a matter of common knowledge.

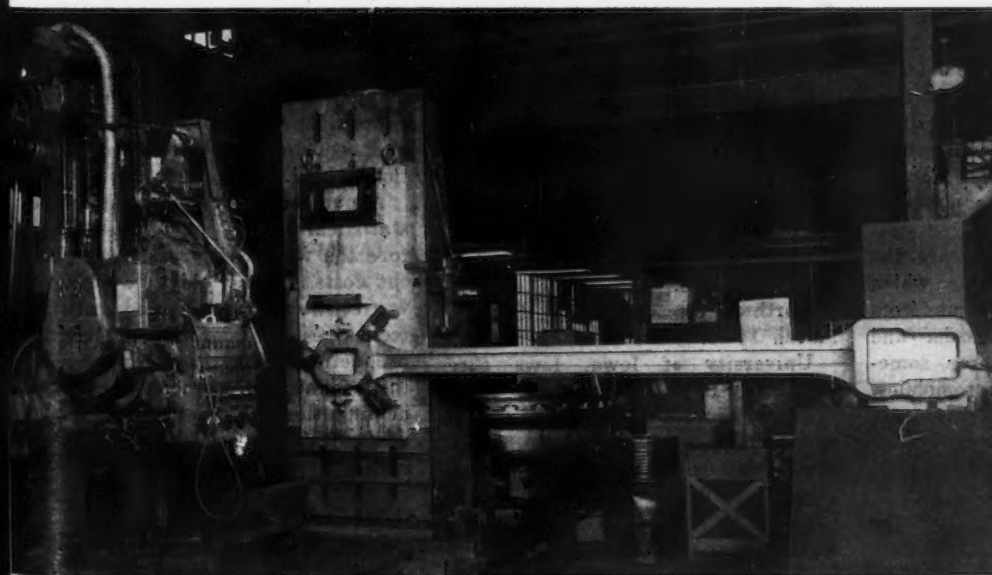
But the need for more and more equipment is ever present . . . and it is machines like the Pratt & Whitney Keller, shown here machining a huge locomotive connecting rod, that are speeding the flow of this vital equipment.

The Keller, which can work in two or three dimensions, is easily and quickly adjusted. With its tracer following a master pattern or template, its cutter carves out the identical contour in metal. Once started, it operates by itself . . . does its own "thinking" . . . maintains its own accuracy.

Also doing 24-hour duty for the railroads are the many Pratt & Whitney Railroad Gages . . . the P&W Railroad Small Tools and Machine Tools. All of these are in great demand because of their extreme accuracy and dependability under all conditions.

Write for full information on the P&W Keller Machine.

● Typical job for the P&W Keller is the machining of the cavities in each end of this locomotive connecting rod. Note the simple and inexpensive template which controls the shape of the cavity. A similar operation is performed quickly and accurately at the other end with the rod reversed. Result: a tremendous saving over conventional methods.



PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD 1 • CONNECTICUT



Assembly Line

STANLEY H. BRAMS

● Manufacturers become aware of increased Japanese war pressure . . . Likely to continue after end of war in Europe . . . Materials in fairly good supply.



commercial trailer program for 1945 is insufficient to cover essential transportation requirements, according to the Truck Trailer Manufacturers Industry Advisory Committee. Originally authorizations for these units, issued last September, called for first half production this year of 11,248 commercial general freight trailers. This amount has since been reduced to 9016.

The apparent necessity for even more assemblies of trailers than are presently allowed appears to develop a hard-and-fast barrier against any output of automotive vehicle haul-away trailers, sought for some time by over-the-road transport carriers. The haulers want to be in a position to handle shipments of automobiles when, if and as they are produced, and their prewar fleets have almost completely been dismantled or converted to war work. These are the ungainly frame trailer units which flow out to dealer showrooms from Detroit, South Bend, Kenosha and other points loaded with three, sometimes five, complete automobiles. Their operation is largely concentrated out of Detroit, and they are largely produced by two specialty suppliers.

Discussion of a specialized postwar requirement like that one sounds rather incongruous in print on the heels of outlines of larger war programs. But Detroit is firmly convinced that when the European war ends, it will do so most abruptly, and permissions to reconvert will come with shocking suddenness. The city's manu-

facturers have no wish to impede war production, but they do want to be able to clear away at this time whatever problems can now be solved and the attitude of the haulaway companies reflects this viewpoint.

WHAT Detroit does not know generally yet is that there has been a fair revision in thinking within the War Production Board and other agencies in Washington, to the effect that the leeway following the European war is unlikely to be as broad as was originally anticipated last summer.

As will be recalled, Washington felt last summer, when belief was general that Germany would collapse by late fall, that practically all controls over production and materials could be eliminated. Controls to be retained would be precautionary, rather than obligatory. Now, however, expectation has been relayed to a few quarters in Detroit that it may be necessary to continue nearly all controls, including those over steel, where it was figured that somewhere around 40 to 50 per cent would be eliminated.

University Courses In Quality Control Are Offered by WPB

Washington

••• The WPB Office of Research and Development has announced eight-day courses at three universities for war industries to obtain assistance in developing improved methods of controlling the quality of their products and preventing waste.

The courses scheduled are:

Ohio State University, Columbus, Ohio, Feb. 7-15.

Northwestern University, Chicago, March 14-22.

University of Iowa, Iowa City, Iowa, May 16-24.

These courses are similar to 30 which have been offered by educational institutions under the sponsorship of WPB and the United States Office of Education, Federal Security Agency.

Some of the advantages to be obtained from these methods, according to WPB, are:

They aid in providing reliable information for the determination of rational tolerances on quality characteristics.

Quite obviously the military does not intend to risk any repetition in the Pacific of the situation which confronted them in late December when the surprise German drive began to empty out the pipelines far faster than they could be refilled at this end.

It should be emphasized that there is no worry over shortages of materials at this time, with the exceptions of lead, among the metals, and hides and leather. We are using more lead than we are obtaining, largely because absence of draft protection for lead miners earlier in the war has now precipitated an acute supply situation. Steel is tightening fast and may be at its worst war stage in the second quarter, but it is not believed to be a long term problem. Copper will not be short if we continue to obtain shipments from the world's sources as in the past. Aluminum sheet, now tight, will relax some time in the next two months after corralling of manpower which was allowed to drift away following overproduction of that metal earlier. The problem will be in fabricating these metals and others, not in obtaining them.

They save essential materials by reducing the production of scrap.

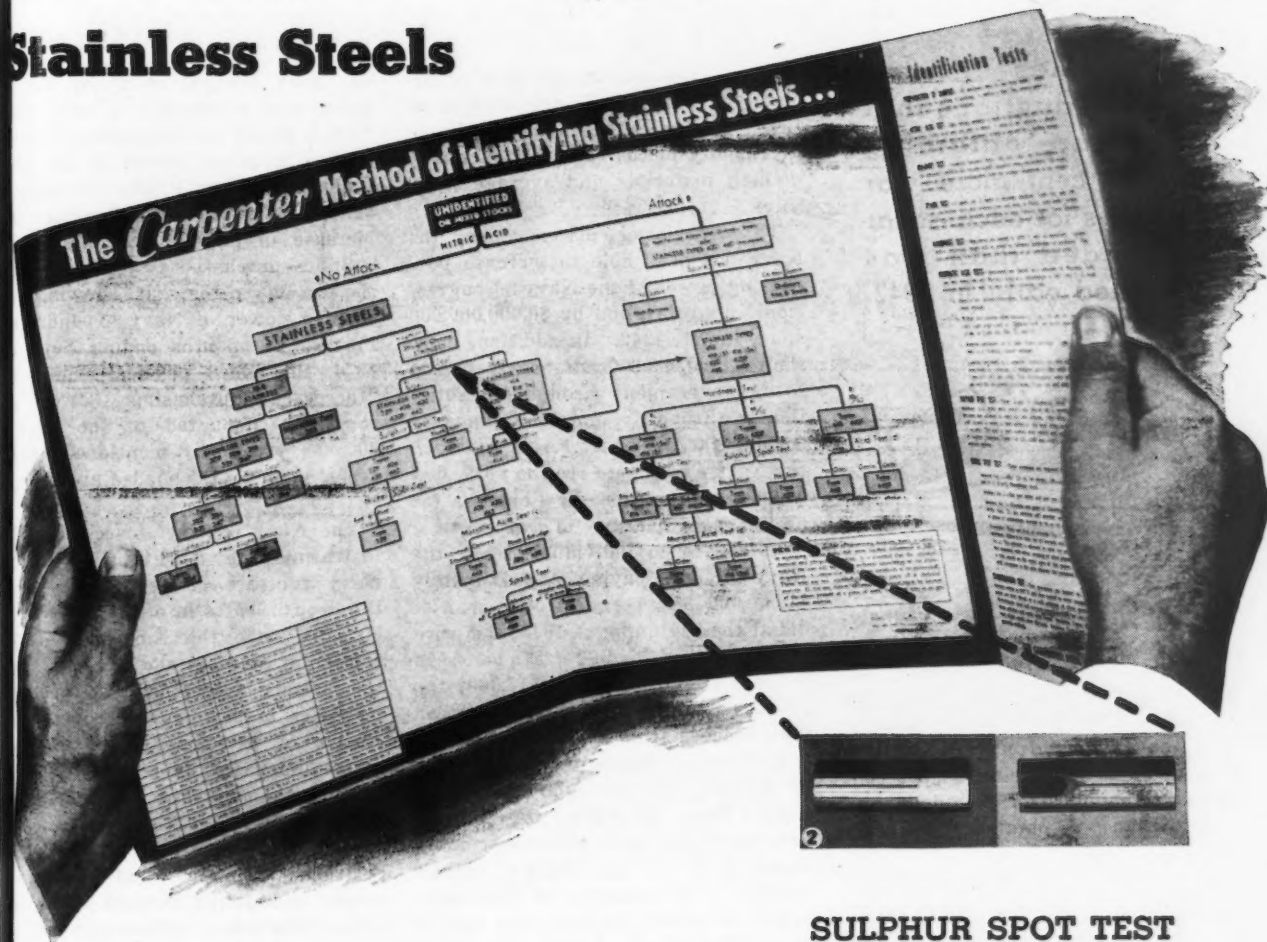
They aid in reducing inspection costs and where sampling is necessary, they provide a scientific basis for the choice of efficient sampling procedures.

They assist in better utilization of manpower by reducing or eliminating rework as well as by cutting scrap and reducing the amount of inspection needed.

A number of large companies used statistical quality control methods before the war to improve quality and cut costs. Many plants working on war contracts have adopted statistical techniques in order to get increased production. They have reported that they found the methods valuable in helping them to meet more exacting demands and stricter standards in spite of poorly-trained personnel and unreliable sources of materials.

Inquiries regarding any of these courses should be addressed to the Director of War Training of the institution offering the course. Information regarding the general training program in industrial quality control may be obtained from the Office of Production Research and Development, WPB, Washington 25, D. C.

To Help You Identify Stainless Steels



SULPHUR SPOT TEST

This is one of the 11 tests used in the "Carpenter Method of Identifying Stainless Steels".

Place three drops of Sulphuric Acid solution (one part Sulphuric Acid, three parts water) on a newly-ground spot of the specimen and allow to react for one minute. One drop of a 5% solution of Lead Acetate in water is then added to the acid drop and allowed to react for 15 seconds. The spot is then washed with water and examined. A positive test for Sulphur (Stainless Types 416 (S), 420F and 430F) is the presence of a black sulphide deposit.

YOU know the troubles a mix-up in Stainless stock can cause in heat treating, machining, stamping, welding or other fabricating operations. So it's important to you to have a quick method for identifying Stainless that may become mixed in stock.

The Carpenter Laboratories have developed a new and simplified chart for identifying various types of Stainless Steel. The Chart diagrams and explains the nitric acid test, magnet, spark, hardness, and muriatic acid tests, sulphur spot and nickel spot tests, and the stabilization test, and shows when and how to use each one. With this chart you can check the identity of Stainless Steels which may be in question.

Use it in your laboratory, to help your stockroom, warehouse or production department check on mixed stocks. To obtain a copy, simply fill out the coupon.

THE CARPENTER STEEL COMPANY

121 W. Bern St., Reading, Pa.

Without obligation, please send me your new chart for identifying Stainless Steels.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ ZONE _____ STATE _____

(PLEASE PRINT)

Carpenter STAINLESS STEELS

Washington . . .

L. W. MOFFETT

•Navy has effected price reductions that today are obtaining 25 per cent more war supplies for each dollar expended than was obtained early in 1942.



WASHINGTON—Recent analyses by the Navy Department's Office of Procurement and Material show that price and profit controls by the Navy since January, 1942, have effected price reductions that today are obtaining 25 per cent more war supplies for each dollar expended than was obtained at the beginning of 1942.

Two of the most effective controls have been the periodic renegotiation of contracts and the closer pricing policy of the Navy Department. The pricing policy, aided by the Renegotiation Act, has been made possible by a careful and continuing analysis of costs and comparative prices and by frequent negotiation. According to Navy officials it has provided a stimulus to contractors to use ingenuity in developing improved production techniques and to utilize labor and material more efficiently.

This closer pricing policy has been responsible in part for the substantial and continuing decline in the Navy Index of Contract Prices, aggregating 21 per cent from Jan. 1, 1942, to Sept. 30, 1944. The substantial decline in Navy contract prices has been accomplished notwith-

standing a concurrent rise in approximately 8 per cent in the Bureau of Labor Statistics Index of Wholesale Commodity prices reflecting increases in both materials and average wage rates.

Through lower prices alone, the Navy has been able to increase purchasing power of the Navy's Congressional appropriation by \$9,400,000,000 since Jan. 1, 1942. In addition, more than \$1,000,000,000 has been returned to the government through renegotiation or through voluntary refunds by contractors. The net result has been the Navy's ability to use the \$105,000,000,000 appropriated by Congress for an increased quantity of war goods.

In regard to individual items, the Navy is now paying approximately \$1,000,000 less per destroyer than it did at the beginning of 1942; the price of one type of landing craft has been reduced from \$21,000 to \$17,000; the price of one type of fighter plane has been reduced from a starting price of \$66,000 to a volume production price of \$32,000 and one type of bomber plane from \$118,000 to \$58,000. Smaller items have also contributed importantly to the Navy's overall savings. For example, 20 mm. cartridges for which the Navy was paying an average of 14c. at the beginning of 1942 have been gradually cut to an average of 9c. each, representing an aggregate saving of more than \$42,000,000 on this item alone.

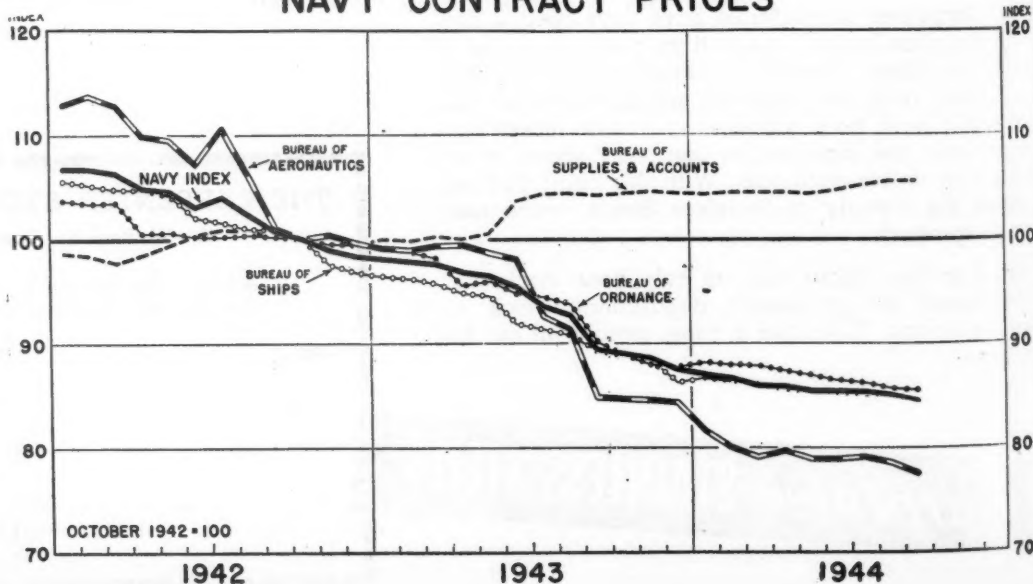
Some approximation of the increased war purchasing power that

has been brought about by reduced prices may be obtained by relating the Navy's Quarterly Expenditures to the decline in prices shown in the Navy Index of Contract Prices. In terms of January, 1942, contract prices the increase in physical volume of war supplies purchased is represented by the top line in the chart showing purchasing power of Navy expenditures. For the 33 months ending Sept. 30, 1944, the added physical volume or "Increased Purchasing Power" so computed amounted to the \$9,400,000,000, previously mentioned and is represented by the shaded area on the chart.

The Navy contract prices chart illustrating the downward trend of Navy contract prices clearly shows the drop in costs in all of the Navy's bureaus, with the exception of the Bureau of Supplies and Accounts. The rise in this index is due to the price increases in petroleum products; exclusive of petroleum costs the Bureau's index for September, 1944, is a fractional point lower than for January, 1942.

By agreement with the Appropriations Committee of Congress, money re-acquired through re-pricing before conclusion of a contract may be spent by the Navy without new Congressional appropriation. However, money re-acquired through renegotiation after completion of a contract is transferred to the general fund of the Treasury and may not be used by the Navy without a new appropria-

NAVY CONTRACT PRICES



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For hearth and slag line maintenance, open hearth men like Magnefer, the well-known, standard clinkered dolomite, so uniform in sizing and unexcelled in performance.

FIRST HELPER FOR LOWER HEARTH MAINTENANCE

HOW can open hearth "delay time" be reduced—now that furnaces are so pushed, month after month, at capacity operation?

The answer lies in the policy of using the best refractories available and in efforts constantly to improve refractory practice.

We supply basic refractories that support such a policy...refractories carefully designed and accurately controlled in manufacture to have desirable physical, chemical and mineralogical properties which enable them to meet severe furnace conditions.

The greatest plus value in Basic Refractories products, however, is that they

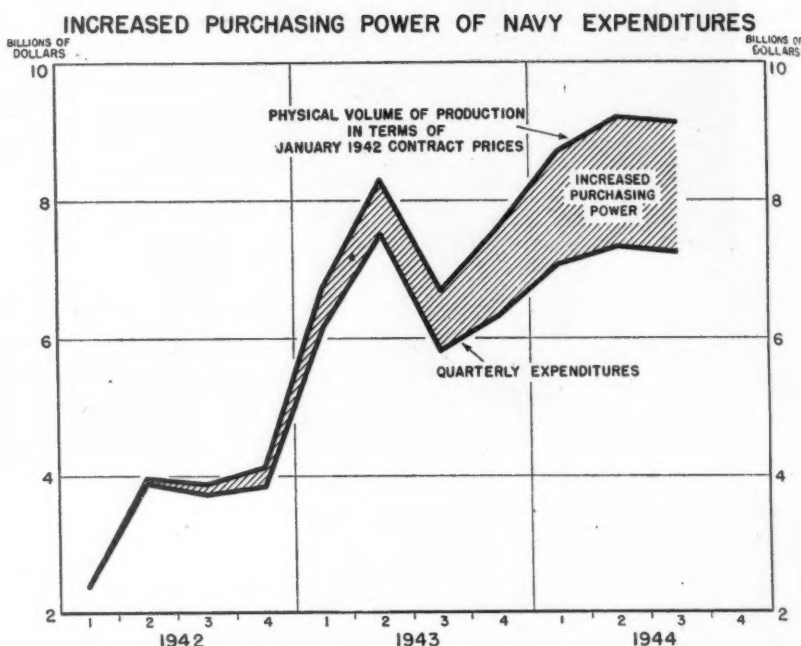
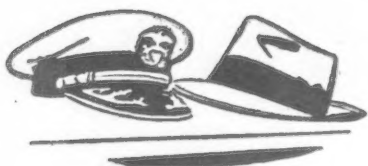
are sold and serviced by representatives who intimately know steel making. "Basic" Sales Engineers are practical steel men, with years of experience making steel. This experience they supplement with a sound knowledge of basic refractories. Often they are able to offer suggestions which help solve tough problems, and so improve refractory practice—in slag line maintenance, in bottom repair, in new hearth construction.

So think of the "Basic" Sales Engineer as your "First Helper" for lower hearth maintenance costs. Use his knowledge and experience freely, to insure that the dependable basic refractories you get from him are yielding the best possible results.



BASIC REFRACTORIES, INCORPORATED 845 HANNA BUILDING
Cleveland 15, Ohio

● Navy concentrates on inventory control . . . Said to be key to cutting costs of war . . . Physical inventory of all materiel made here and abroad.



tion. Thus the savings resulting from Navy price control may be reflected in the reduction of the total cost of the war to the public and not just in Navy expenditures.

Although the Navy does not expect to be able to fire the last bullet at the last Jap, coordination of procurement with inventory control

should help to cut down the amount of surplus Navy material that will be available at the war's end.

Secretary of the Navy James V. Forrestal, discussing inventory control methods, which he directed to be instituted in May, 1944, had the following to say at a recent press conference:

"We have many depots and their

importance to the war and the economy is that we have to keep a supply that will enable the fleet to get what it wants quickly. However, if we permit that to be inert storage—to be of materials that we aren't using—we are committing the sin of using American facilities to produce goods that are not being used for the war, and at the end of the war we wind up with a vast surplus that has to come on civilian markets. Furthermore, if we don't keep a selection slip between the supply on hand and our production, it means that the emphasis will not be applied to those items that are tight—such as shells, rockets, airplanes and so forth—so the management of our inventory has a direct relation to the success with which we meet our responsibilities."

The inventory job was under the direction of Rear Admiral James M. Irish, U. S. N., Assistant Director of Procurement and Material and was completed by Dec. 31, 1944. The Navy inventoried \$6,500,000,000 worth of material, covering more than 2,000,000 different items in the continental United States and the 10th, 14th and 15th Navy Districts. It covered 840 different activities of the Navy, Marine Corps and Coast Guard and has given the Navy a complete listing of all commodities on hand and available for issue. The inventory did not cover capital or plant equipment. The material inventoried occupies 175,000,000 sq. ft., or more than six and a quarter miles of storage

(CONTINUED ON PAGE 102)

THE BULL OF THE WOODS

BY J. R. WILLIAMS



WHAT IS

"Plunge Forming" or Crush Dressing OF GRINDING WHEELS?

Is Crush Dressing New?

Yes and no—it is relatively new "over here" for general commercial use, but it has been standard practice in other countries for some time.

Who Introduced It Commercially to the U. S. A.?

Knowing of this practice, representatives of the Sheffield Corporation, Dayton, Ohio, visited England in 1939 to investigate crush dressing. So impressed was Sheffield with the possibilities that patent and manufacturing rights were obtained for producing this equipment in America. A few weeks later an English concern placed an order with Sheffield for a large number of thread grinders especially designed for the crush method of wheel dressing.

What was the First Commercial Machine to be Produced in the U. S. A. Using Crushed Wheel Dressing?

The Precision Thread and Form Grinder was designed, manufactured, and sold by The Sheffield Corporation of Dayton, builders of gage thread grinders for thread gage production since the first World War. This new machine tool is equally proficient in producing precision threads or forms (regular and irregular) from a crush dressed wheel.

What is Crush Dressing?

Crush dressing is the process of using hardened steel rolls to form or dress grinding wheels to a wide variety of shapes which in turn can be transferred to the work part.

How is the Crusher Roll Produced?

The same form that is to be crushed into the wheel is ground into a hardened steel roll approximately three inches in diameter by the use of the Sheffield Micro-

Form Grinder. The profile is reproduced directly from a drawing. A pantograph positions a microscope to guide the operator in feeding the grinding wheel into the steel roll to an accuracy of .0003".

Original crusher rolls for threaded parts are produced on the Sheffield Precision Thread and Form Grinder by using a single point wheel.

Many additional crusher rolls for either forms or threads can be reproduced quickly and at minimum cost by using crush dressed wheels on the Sheffield Thread and Form Grinder.

Can the Wheels of Surface Grinders be Crushed Dressed?

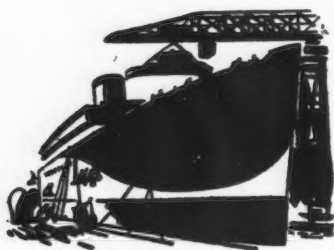
Yes, they can. At the same time the Sheffield Corporation pioneered the commercial use of crush dressing for producing circular forms and threads, it also pioneered the use of this method for dressing surface grinder wheels and the development of standard mountings for crusher rolls on surface grinders. Sheffield has unmatched research and commercial experience in crush dressing for surface grinding and has counselled with many plants making critical war materials on the solution of production problems by crush dressing.

Where Can More Detailed Information on Crush Dressing be Obtained?

Full information on crush dressing, production of crusher rolls for surface grinders, the Precision Thread and Form Grinder especially developed for crush dressing, and the Micro-Form Grinder for producing crusher rolls, can be obtained from The Sheffield Corporation, Dayton 1, Ohio, U.S.A. Engineering data will be forwarded promptly.

ADVERTISEMENT OF THE SHEFFIELD CORPORATION

• Heat is on again in Puget Sound area for more manpower . . . This area needs 26,000 more workers but local authorities say housing is big headache.



SAN FRANCISCO—"How would Henry Wallace as Secretary of Commerce and possible Director of RFC, DPC and other federal major loaning agencies eventually deal with the steel, aircraft, shipbuilding, war housing, magnesium, aluminum and varied other war industry developments on the West Coast? What light (or darkness) does this new factor throw onto the already blurred and composite postwar industrial picture of the Far West?"

Those are questions that have been on every thoughtful tongue recently, for the possibility of long-run conversion and hence time utilization with primary emphasis on social uplift, planned economy, fiat jobs and the abundant principles based on profit-motive operation and what has previously been considered sound, integrated industrial economics, may completely change the outlook.

Every important management contractor, save possibly the Kaiser interests, has felt a shadow fall upon his tentative postwar plans, already provisional and subject to almost imponderable variables. When the nominated secretary anticipates protection business against monopoly, no one on the ground seems able to determine what is business and what is monopoly.

So a lot of new blurred question marks are added to the already complex interrogation as to the industrial Far West in the postwar period. A growing number of executives are ready to throw up their hands in

despair. If Secretary Harold Ickes with his huge hydro-electric potential and Senator Pat McCarran with his southern-western political bloc should combine with Secretary Wallace and his aspirations for the common man to plan and execute a future industrial pattern West of the Rocky Mountains, it seems evident that management might be spelled with a very small "m" and labor with a very large "L," while private capital and conventional competitive practice might be suspect from starry start to futile finish.

Meanwhile, present problems press and the heat's on again in the Puget Sound area as war industry plants cry for 26,000 more workers, and the local war manpower authorities agree to and verify the requests, with the very practical exception that there is no place to house the newcomers. The housing situation in the Pacific northwest seems to be at its worst, for even allotments and authorization now would not provide dwelling before six months, by which time whatever is to be done must be completed.

Boeing needs 2000 additional workers immediately to increase its production from 35 to 200 Superfortresses a month by July, an increase of 500 per cent. Company recruiters are combing 42 states. One day last week 49 new families arrived in Seat-

tle to work for Boeing, but there was no place for them to stay. Dormitories have been setup to house newcomers for a week while they get located, but people have had to continue living there for several months and many finally surrender and move on in futility. Even many existing housing projects are seriously unpopular, for in the Wintertime workers resent the cheap draughty structures. Once they are housed anywhere neither the OPA nor any other government agencies permit tenants to move into new and better housing developments.

Waterfront unrest this past month has been added to the serious manpower and housing shortage problems. Teamsters, storekeepers and warehousemen employed at shipyards doing repair work are agitating for the repair differential of 11.6 per cent premium over shipbuilding wages on new construction. The old "40 hr." peacetime practice to compensate for the unattractiveness and difficulty of work in foul bottoms on repair jobs whereby a man got 8 hr. pay for 7 hr. work has now been so standardized that repair yard wages set a new higher goal for all adjacent workers to aspire to. Hearings are underway before WLB which involve the shipbuilding and repair yards and the Metal Trades Council and the warehousemen's and teamsters' union. An additional jurisdictional tiff between CIO longshoremen at Olympia and AFL freight checkers at the same point has seriously delayed outgoing lend-lease shipments for Russia. AFL and its ILA is pretty generally dominant at Tacoma and Seattle, but Olympia has been organized by CIO and its ILWU and in the struggle for power from 135 to 400 carloads of lend-lease freight for Russia are held up.

Considerable numbers of soldiers, sailors, marines and merchant seamen are putting in extra hours and earning extra money as longshoremen on Puget Sound. They receive a temporary permit to work by the union and are not required to pay dues. They work mostly on day shifts for \$1.10 an hr. straight time and \$1.65 an hr. overtime.

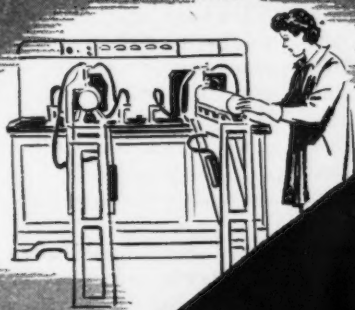
Douglas needs 1000 additional

Cited for Awards

• • • The following companies have received Army-Navy "E" awards for outstanding war production:

Barker & Williamson, Upper Darby, Pa.
Bears Mfg. Co., Chicago.
Blue Ridge Rubber Co., Littlestown, Pa.
Buckeye Tool Corp., Dayton, Ohio.
Commercial Controls Corp., Plants A and B, Rochester, N. Y.
Coolerator Co., Duluth, Minn.
Hollingsworth & Whitney Co., Chickasaw Mills, Mobile, Ala.
Independent Metal Products Co., Omaha, Neb.
Mantua Metal Products Co., Woodbury Heights, N. J.
Metal Forming Corp., Elkhart, Ind.
Montague Castings Co., Muskegon, Mich.
Pick Mfg. Co., Plants I and II, West Bend, Wisconsin.
Rheem Mfg. Co., Birmingham, Ala.
H. & A. Selmer, Inc., Jesse French & Sons Mfg. Division, Newcastle, Ind.
Stolper Steel Products Corp., Milwaukee.
U. S. Cabinet Bed Co., Brooklyn.
U. S. Rubber Co., Winnsboro, S. C.
John R. Wald Co., Tyrone, Pa.

HOTTEST thing in Ordnance



155 mm. Shells
Heated in 60 Seconds
by **TOCCO**

HEAVY AMMUNITION . . . highest priority product in the United States today . . . gets top heating speed and top quality in scores of plants with TOCCO Induction Heating.

One large producer reports these advantages of TOCCO heating for nosing 155 mm. shells, compared to conventional heating methods:

HIGH SPEED. A 10" length of the shell is TOCCO-heated to 1800° F. in 60 seconds. Arranged in pairs, the TOCCO machines supply each nosing press 120 shells per hour.

HIGH QUALITY. Uniform, split-second timing of TOCCO heating, applied to an exact area,

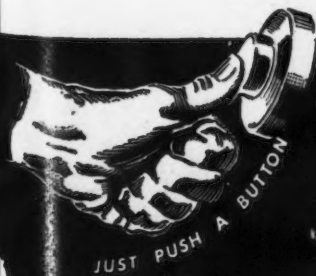
assures uniform nosing results for every shell.

DEPENDABLE. TOCCO machine is a compact, self-contained unit including motor-generator and all controls. Simple to install and reliable in operation.

GOOD WORKING CONDITIONS. No radiant heat. No smoke. Speedy, *localized* TOCCO heating permits easy handling of heated shells with gloved hands. Simple for girls to operate.

Call our Engineers for assistance in the application of TOCCO to *your* war production and postwar planning. A free copy of "Results with TOCCO" is yours for the asking.

THE OHIO CRANKSHAFT COMPANY • Cleveland 1, Ohio

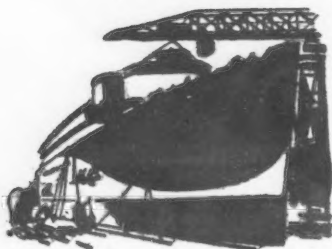


TOCCO

INDUCTION

**HARDENING . . BRAZING
ANNEALING . . HEATING**

● Heavy new contracts let for amphibious vehicles . . . New records still being set by railroads . . . New organization formed for production of flumite tubing.



workers above turnover replacements at its Santa Monica plant immediately to accelerate its sharply increased schedules. The company estimates that at least 4500 additional workers will be needed between Santa Monica, El Segundo and Long Beach during the coming months. An increase of 250 per cent has been set for production on the C-54 Skymaster by late Summer.

An encouraging word comes from the Aircraft War Production Council, comprising the eight principal airplane makers, in a report of a 30 per cent increase in the number of men hired during the first two weeks in January as compared with the first two weeks of December. There was at the same time a 38 per cent decrease in terminations among men for the same period. Employment of

women in the aircraft industry has remained at the high level of 43 per cent for more than a year and one plant has 60 per cent women in direct factory work.

* * *

Food Machinery Corp. of San Jose has announced two new Navy contracts which call for production of \$32,677,950 worth of "water buffalo amphibious tanks." The new contracts will keep the corporation's plants at San Jose and Riverside, Calif., and Lakeland, Fla., busy until September and the backlog of unfilled orders now stands at 207 million dollars. This company more than tripled its production in the fiscal year ended September 30 over the preceding fiscal year and reported gross sales volume of \$179,951,355.

* * *

Southern Pacific Railway's freight and passenger volume is considered one of the prime indices of Far Western activity, and again last year, for the fifth year in a row, its net ton miles of freight hauled set a new all-time high. The aggregate load was nearly three times the load carried in 1939. Passenger miles for 1944 showed an 11 per cent increase over the previous year and was five times those of 1940.

* * *

Northwest Tube & Metal Fabricators, a new organization at Portland, Ore., is contracting for the con-

• • •

COAST GUARD DELIVERS GOODS: Landing craft manned by coast guardsmen bring the supplies ashore on Luxon following the first wave of assault troops. While the fighting progresses the skeleton crews shuttle back and forth with ammunition and food.

struction of a plant 100 x 100 ft. to manufacture three types of flumite tubing in two 12 in. sizes of almost any length. The company announced that its product will be distributed through jobbing channels and will include hot-dip galvanized after-fabrication, black asphaltum industrial enamel after fabrication and plain black tubing. The pipe will be equipped with pierce couplers and handles and used for sprinkler irrigation, hydraulic mining and slicing. Harry L. Yager will be general manager of the plant and B. L. Keys, manager of Columbia Wire & Iron Co., is consulting engineer on the project.

* * *

So near to saturation is automobile, truck and interurban rail traffic on the nine-lane and double-rail-truck San Francisco-Oakland Bay Bridge that serious consideration is being given to the practicability of a second trans-bay bridge. This would probably be a postwar project and most likely would link the southern industrial area of the San Francisco peninsula with Alameda. It is roughly estimated that the cost of such a bridge would be between \$100,000,000 and \$125,000,000, but if its traffic experience and acceptance were in any measure comparable to the present trans-bay bridge, it may well be considered a future investment rather than an extravagance. Traffic studies are now being made.

* * *

That hush-hush Hanford Engineering Works in eastern Washington is emerging just a tiny bit from its huge blanket of secrecy. Hundreds of millions of dollars have gone into it and thousands of workers are now engaged.



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385 TON HYDRAULIC STRETCHING
AND DETWISTING MACHINE

HYDROPRESS • INC.

ENGINEERS

CONTRACTORS

HYDRAULIC PRESSES • ROLLING MILLS
STRETCHERS • PUMPS • ACCUMULATORS

570 LEXINGTON AVENUE • NEW YORK • N. Y.

PERSONALS

• **R. J. Harrison** has been appointed president in charge of manufacturing, Harrison Steel Castings Co., Attica, Ind.; **G. W. Harrison** has been made vice-president in charge of sales and **W. C. Harrison**, secretary and treasurer in charge of purchases and accounting.

• **Clinton R. Hanna**, inventor of the tank-gun stabilizer, has been appointed an associate director of the Westinghouse research laboratories, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Mr. Hanna, who is also manager of the electro-mechanical department of the research laboratories, has been associated with Westinghouse since 1922 in the development of new apparatus. For his work in the development of the tank-gun stabilizer he was awarded a presidential citation in 1942.

• **George E. Griffith** has been appointed general traffic manager of the Carborundum Co., Buffalo. Mr. Griffith had been traffic manager of the company's Niagara Falls plant since 1923. **Karl S. Wright** has been named traffic manager at the Niagara Falls plant.

• **Alexander M. Hamilton**, vice-president in charge of foreign sales, American Locomotive Co., New York, has been named president of a newly formed subsidiary, American Locomotive Export Co., Inc. Mr. Hamilton has served with the American Locomotive Co. in various positions since 1910, becoming vice-president in charge of foreign sales in 1944.

ALEXANDER M. HAMILTON, president, American Locomotive Export Co., Inc.



• **James D. Glenn** has been elected vice-president in charge of sales, Eastern Stainless Steel Corp., Baltimore. Mr. Glenn was formerly assistant general manager of sales, Sharon Steel Corp., Sharon, Pa.

• **Richard H. Rowland** has been named vice-president of the National Battery Co., St. Paul, Minn., in charge of the Gould Commercial Division, Depew, N. Y. Mr. Rowland, formerly vice-president of the St. Paul Engineering & Mfg. Co., succeeds **Harry G. Barnes**, who has become vice-president in charge of sales at St. Paul.

• **William J. Murray** has been appointed assistant sales manager, Fence Division, Wickwire Spencer Steel Co., New York. For the past 15 years Mr. Murray has been in charge of the eastern division of the Fence Department, Pittsburgh Steel Co.



R. E. FRITSCH, president, Tube Turns, Inc.

• **R. E. Fritsch**, vice-president of Tube Turns, Inc., Louisville, since 1929, has been elected president, succeeding the late **Walter H. Girdler, Sr.** Mr. Fritsch continues as vice-president and a member of the board of directors, The Girdler Corp., Louisville, of which Tube Turns is an affiliate.

• **F. H. Craton** has been appointed assistant manager, transportation divisions, General Electric Co., Schenectady. For the present Mr. Craton will also continue his duties as manager of the Industrial Haulage Division. Mr. Craton joined the company in 1924, serving in the railway equipment and transportation engineering divisions until his appointment in 1941 as manager of the Industrial Haulage Division.



HERMAN H. BROOKSIEKER, vice-president in charge of manufacturing, Kaydon Engineering Corp.

• **Herman H. Brooksieker** has been appointed vice-president in charge of manufacturing, Kaydon Engineering Corp., Muskegon, Mich. Mr. Brooksieker for the past seven years was vice-president and superintendent of the Pesco Products Division, Borg-Warner Corp., Cleveland. Prior to that time he had been affiliated with Marguette Metal Products Co., Hupp Motor Car Co., and Chandler Motor Car Co., all of Cleveland.

• **A. O. Thalacker** has been appointed vice-president and general manager, and **E. W. Allison**, secretary of the Detrex Corp., Detroit.

• **Albert G. Belden**, formerly chief engineer, Grinding Machine Division, Norton Co., Worcester, Mass., has been appointed manager of research and engineering of that division; **Iver G. Freeman** has been made factory manager; **Roger Magoun**, production manager and **C. Denson Day**, sales manager.

• **Donald J. Boudinot** has been appointed to the newly-created post of Buffalo district manager for the Toledo Scale Co., Toledo. Mr. Boudinot, associated with the firm for 14 years, was senior sales engineer in Chicago prior to his recent appointment.

• **C. F. Patterson** and **John A. Owen** have joined the field engineering staff of the Eutectic Welding Alloys Co., New York. Mr. Patterson's headquarters will be in Michigan and Mr. Owen's in North Carolina.

• **George A. Turmail** has been appointed special representative of the Continental Can Co., New York.

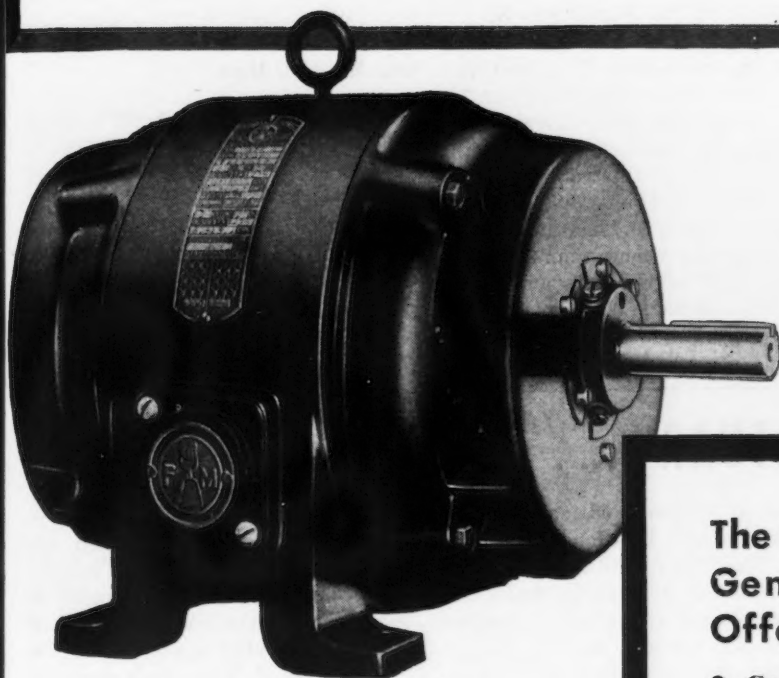
"A name worth remembering"

FAIRBANKS-MORSE



Fairbanks-Morse postwar products will serve you with the *dependability* the world has come to associate with our name. Designing and manufacturing skills will not have to be re-learned in our plants as we turn to civilian production, because as a part of our war job, we've continued to build and improve our peacetime Diesel engines, generators, motors, pumps, and scales.

R. A. Morse Jr.
General Sales Manager



The New Fairbanks-Morse General-Purpose Motor Offers These Features:

- **Copperspun Rotor** — centrifugally cast, exclusive.
- **Protected Frame** — excludes solids and liquids.
- **Optional Conduit Box Assembly** — conveniently adaptable.
- **Cross-Flow Ventilation** — assures uniform cooling.
- **Ball Bearings** — sealed in, protected.
- **Rated 40° C.** — continuous duty.

MOTORS

Diesel Locomotives • Diesel Engines
Scales • Generators • Motors • Pumps
Magnetos • Stokers • Railroad Motor
Cars and Standpipes • Farm Equipment

FAIRBANKS, MORSE & CO.
CHICAGO 5, ILLINOIS

Buy More War Bonds



FRANK W. SMITH, vice-president, Norton Co.

• **Frank W. Smith**, **Milton P. Higgins** and **Ralph M. Johnson** have been appointed vice-presidents of Norton Co., Worcester, Mass. Mr. Higgins continues as treasurer, and Mr. Johnson as general sales manager of the Abrasive Division. Mr. Smith has also been appointed manager of the Grinding Machine Division, succeeding **Howard W. Dunbar**, vice-president, who will continue to serve the company in an executive capacity. Mr. Smith has been with the organization for 26 years, becoming sales manager of the Grinding Machine Division in 1932 and assistant manager in 1943.

• **J. Wallace Johnson** has been elected a vice-president and general manager of Birmingham Slag Co., Birmingham, Ala.

• **Leonard K. Weeks** and **John R. Gough** have joined Kennametal, Inc., Latrobe, Pa., as tool engineers, with headquarters at Detroit.

• **Arthur L. LaMasters**, formerly general manager and chief engineer of Claud S. Gordon Co., Chicago, has been elected vice-president in charge of operations, Alloy Casting Co., Champaign, Ill.

• **Cloyd W. Richards** has been appointed assistant service manager and **Sam E. Beebe**, manager of service engineers, R. G. LeTourneau, Inc., Peoria, Ill. Both Mr. Richards and Mr. Beebe joined the company in 1937.

• **J. Walter Dietz**, industrial relations manager of the Manufacturing Department, Western Electric Co., New York, has retired after more than 42 years of service.

• **James C. Hartley** has been appointed director of research of the Pittsburgh, Bridgeport, and Detroit plants of the Heppenstall Co., Pittsburgh. Mr. Hartley has also been appointed chairman of the Research Committee.

• **W. L. Hunter** has been named chief engineer of the Northern Equipment Co., Erie, Pa. Mr. Hunter will supervise engineering, design and research. **H. A. Schlieder** succeeds Mr. Hunter as assistant chief engineer. **H. H. Weining** has been appointed director of research.

• **T. J. Wells**, formerly assistant superintendent, has been promoted to superintendent of blast furnaces, the Steel Co. of Canada, Ltd., Hamilton, Canada, and **A. D. Fisher**, formerly assistant superintendent of coke ovens, has been made superintendent.

• **James H. Baldrey** has been appointed superintendent of the melting department of the Watervliet, N. Y., plant, Allegheny Ludlum Steel Corp., Pittsburgh, succeeding **T. F. McClesker**, who has retired after serving 20 years in this position. **Edward J. Doyle** has been appointed superintendent of the hammer shop, replacing **W. H. White**, who has retired after serving 25 years as superintendent. **W. O. Jackson**, for more than 20 years superintendent of hot mills and hammers at the Dunkirk, N. Y., plant, has retired.



N. R. JOHNSON, factory manager, Buffalo Forge Co., as announced in the January 18 issue of *The Iron Age*.

• **Robert E. Bockrath** has been appointed manager of magnesium sales for the Houston office, Dow Chemical Co., Midland, Mich.

• **Edward F. Theis**, previously works manager of the refrigerator division, has been elected vice-president in charge of refrigerator production for Philco Corp., Philadelphia.

• **Glenn H. Barnes** has been appointed to the engineering staff of the Great Lakes Foundry Sand Co., Detroit.

OBITUARY . . .

• **Frank L. Gibbons**, 53, sales manager, Alloy Steel Division, Carnegie-Illinois Steel Corp., Pittsburgh, died suddenly January 19 at his home in Chicago. Prior to joining Carnegie in 1936, Mr. Gibbons had for three years been vice-president of Timken Steel & Tube Co., Canton, Ohio. Previous associations included Crucible Steel Co. and Republic Steel Corp.

• **C. W. Heppenstall**, chairman of the board of Heppenstall Co., Pittsburgh, died January 15. Mr. Heppenstall had been associated with the company for almost 52 years. Since 1898 he had been successively superintendent, general manager, president and board chairman.

• **Charles H. Keyes**, 63, well-known engineer associated with Barbour, Stockwell Co., Cambridge, Mass., died recently.

• **Roberts B. Thomas**, secretary and general counsel of the American Institute of Steel Construction, New York, died January 23. He was 53 years old. Mr. Thomas joined the Institute in 1935 as general counsel and became secretary and counsel in 1943. Previous to that time he had served as executive secretary of the Iron League of New York and the New York Structural Steel Board of Trade.

• **John P. Tierney**, 53, president and treasurer of the General Machine Corp., Newton, Mass., died recently.

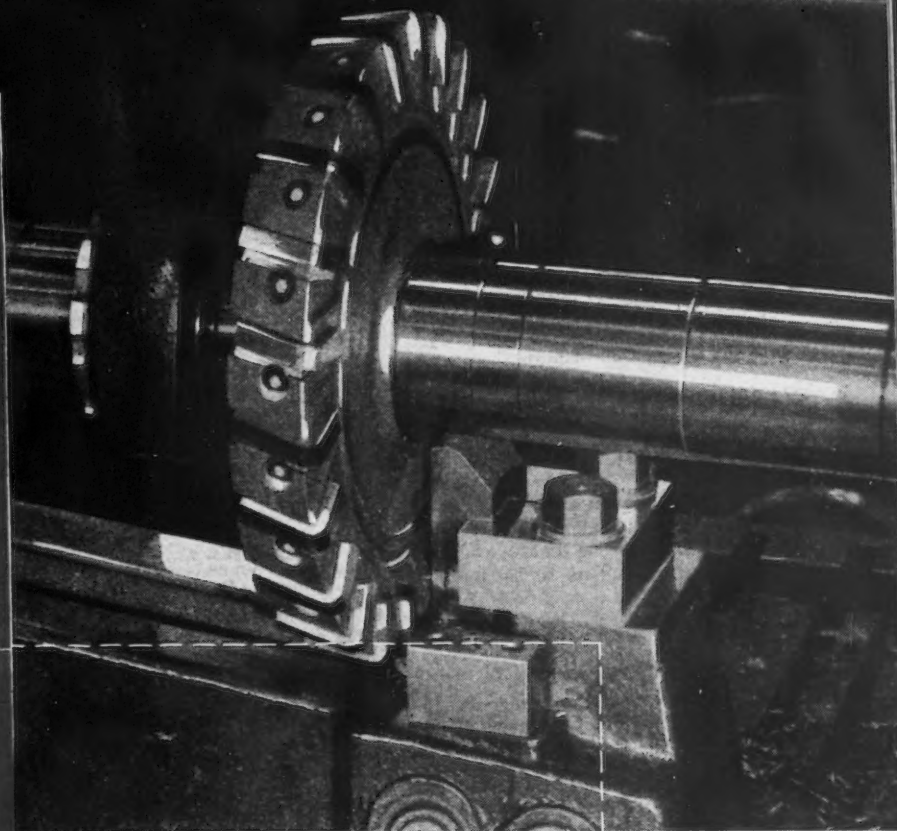
• **John W. Rathbun**, general manager of the S. W. Card Mfg. Co., Mansfield, Mass., died January 16.

• **William J. Lyman** of Birmingham, southern sales manager for the National Cast Iron Pipe Division of James B. Clow & Sons, Chicago, died January 15. Mr. Lyman, who had been associated with the company since 1929, was 57 years old.

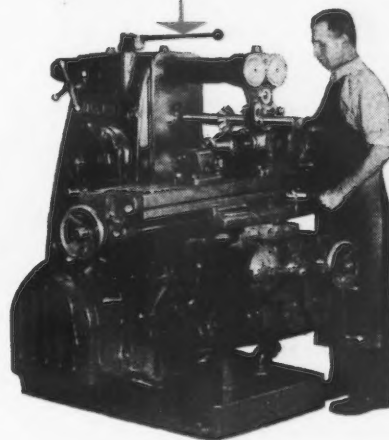
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Dear Editor:

METLBOND ADHESIVE

Sir:

Please inform me of firms in the metropolitan area familiar with the use of metlbond adhesive for metals described in the article by that name in the Jan. 18 issue.

A. R. HEATH, Jr.,
Specifications Engineer
Titeflex, Inc.,
500 Frelinghuysen Ave.,
Newark 5, N. J.

● Metalbond adhesives have not yet been made available for general use by the developer, the Consolidated Vultee Aircraft Corp., San Diego, Cal.—Ed.

WAREHOUSE STEEL PRICES

Sir:

Your Seattle price for hot rolled bars shows \$4.35¹² per 100 lb., whereas the OPA RPS-49 dated April 8, 1943, lists this item at \$4.20¹² per 100 lb. Please explain the discrepancy in price and inform us as to the meaning of earmark 12.

E. M. HARBOR,
Tacoma Division
Todd Pacific Shipyards, Inc.,
Tacoma 1, Wash.

● This price schedule, by amendment 18 dated Oct. 4, 1943, has been modified to show a base price for this item at Seattle of \$2.80 per 100 lb. plus a warehouse spread of \$1.55 per 100 lb. which makes up the total of our current price listing for a base quantity ranging from 300 to 9999 lb. Our footnote 12 refers to this base quantity.—Ed.

NONFERROUS ALLOYS

Sir:

Please send three copies of the 36-page nonferrous alloys specification table from the Sept. 14 issue.

W. FRED STEWART,
Chief Engineer
Spartan Aircraft Co.,
Tulsa, Okla.

Sir:

Will appreciate ten additional copies.

C. W. BAKER
Chase Brass & Copper Co.,
Milwaukee 3, Wis.

● These are available at 25c. per copy; in quantities of five or more, 16c.—Ed.

MAGNESIUM WELDING

Sir:

Please send two copies of "Tooling for Magnesium Welding," by K. L. Kline, in the Aug. 31 issue.

A. H. SCHULTZ,
Purchasing Agent
Revere Copper & Brass, Inc.,
Baltimore 3

● Tear sheets mailed.—Ed.

GRINDING WHEELS

Sir:

Please inform us of articles which have been published on the production of grinding wheels from aluminum oxide, silicon carbide or boron carbide. We are particularly interested

in types of binders and processing methods in use.

J. F. ERVIN
Alloy Metal Abrasive Co.,
Ann Arbor, Mich.

● Some information on the manufacture of grinding wheels is contained in the book "Grinding Wheels and Their Uses," by Johnson Heywood, published by the Penton Publishing Co., Cleveland. A fuller treatment of the subject is contained in the first edition which may be located on file in an engineering library.—Ed.

STEEL CONSUMPTION

Sir:

Have the figures published annually in THE IRON AGE for the consumption of finished steel in the U. S. by industry been consolidated for the period from 1922 to 1939?

S. BAND,
Statistical Department
Stewarts & Lloyds, Ltd.,
Broad Street Chambers,
Birmingham 1, England

● Consolidated figures are to be found in the annual issues dated Jan. 2, 1941, p. 94 and Jan. 4, 1944, p. 59.—Ed.

AGE HARDENING ALLOY

Sir:

The News Front for Nov. 23 speaks of a new precipitation hardening alloy containing 60 per cent copper and 20 per cent each nickel and manganese. I should like to have further information about this metal as to its source, properties and availability.

L. W. SMITH
Metallurgical Research
Curtiss-Wright Corp.,
Airplane Div.—Research Laboratory,
Buffalo 5, N. Y.

● This alloy was developed by the W. M. Chace Co., Detroit, from whom further information can be obtained. See next week's issue for additional details.—Ed.

Sir:

Please send further information.

J. J. LAUDIG
Office of Research Engineer,
The Delaware, Lackawanna &
Western R.R. Co.,
Scranton, Pa.

● This development was made in the laboratories of the International Tin Research and Development Council whose American representative is Battelle Memorial Institute, Columbus, Ohio.—Ed.

PLASTIC COATINGS

Sir:

In THE IRON AGE for Dec. 28 there is an article on plastic dip coatings. Please inform us as to the plastics used for this purpose and who in this locality is prepared to handle this work?

L. ECKERT
Harco Steel Construction Co., Inc.,
1180 E. Broad St., Elizabeth 4, N. J.

● So far as we know ethyl cellulose is the only plastic used for dip coating to protect

metal parts. This process was fostered by Army Ordnance to protect metals shipped to the tropics from corrosion. We know of no one locally handling such work on a contract basis. However, the Youngstown Miller Co., Sandusky, Ohio, is a leading manufacturer of dip tanks and may be in a position to direct you.—Ed.

PHOSPHOR BRONZE FLUX

Sir:

In News Front for the issue of Nov. 16, it is said that bronzes of greatly increased strength and toughness have been developed in Britain. Since we are very interested in the development of bronze alloys, we should appreciate information on the source of your article or the British group responsible for this development?

F. H. LINTHICUM,
Sales Manager
Koppers Company, Inc.,
Bartlett Hayward Div., Baltimore 3

COATED ABRASIVES

Sir:

"Coated Abrasives for Production Surface Finishing" by J. Albin in the Jan. 18 issue gives a clear picture of developments in this field. The subject is broad and important. Were it to be skimmed over lightly, misleading information might be the result. Can we purchase 50 to 75 reprints for use in an educational program?

GLENN E. WINTON
Manager, Coated Abrasive Div.
Mid-West Abrasive Co.,
Owosso, Mich.

● Reprints are ordered and will be forwarded soon.—Ed.

TRANSLATION ERRORS

Sir:

Accustomed as I am to retranslating these bits of forced culture emanating from those groups of the Herenvolk misnamed translation bureaus, I can see that the outpouring of scrambled terms identified as "Drawing Wire from High Speed Steel Ingots" from the Dec. 28 issue of THE IRON AGE may have had some basis in experimental work. The high speed ingots 6 mm. in size may have been wire rods. The tensile strengths of 14 to 15 lb. per sq. in., about right for tooth paste, look more reasonable in kg. per sq. mm. But a speed of 12 per minute is either very fast, or very slow, or something. The last sentence evokes an image of little Tommy eagerly bending over the chemical set that Santa left in his stocking and solemnly noting the fact that steel wire, when pickled, shows surface corrosion. Please don't do this again.

KENNETH B. LEWIS,
Consulting Engineer
43 Midland St., Worcester, Mass.

● There is no excuse for this ridiculous technical filler, for irrespective of errors in translation and conversion these obvious errors should have been detected prior to publication. We'll just have to sweat this one out.—Ed.

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This Industrial Week

- **Steel Industry Setback Worst in Years**
- **Ingot Rate Drops to 89.5 Per Cent**
- **Order Volume Climbs to New Highs**

A COMBINATION of severe weather, freight embargoes, manpower shortages and employee fatigue gave the steel industry this past week one of its most drastic production setbacks since the war started. By midweek there was no indication that a rebound to the full pre-storm level of ingot output would materialize in the immediate future.

The raw steel rate for the country has fallen three points this week to 89.5 per cent of rated capacity. Some curtailments which were existent a week ago are still in effect this week.

Some of the back-up in the nation's steel mills which has caused a shutting down of furnaces can be charged to the drastic rail freight embargo which ended Tuesday midnight of this week. There were some indications, however, that a new embargo might be put into effect in the immediate future.

Although the overall results of the most recent freight embargo may not be known for about a week, and although this action will be of considerable assistance in getting lines cleared to ports and to Army and Navy operations, it nevertheless caused considerable disruption of normal steel operations. Part of this was due to a misunderstanding of the order as, for instance, when coal miners were ordered not to report to work.

EARLY this week the Buffalo district seemed to be the hardest hit by a combination of embargo, weather and manpower problems. Ingot output in that area was scheduled at 29 per cent early this week compared with 93 per cent the week before. On Tuesday of this week Bethlehem at Buffalo was operating 10 out of 30 open hearths, Republic Steel Corp. had all nine of its furnaces down, while Wickwire was unable to operate its four furnaces.

At Pittsburgh steel losses this week at one plant alone amounted to 19,000 tons and coal stocks at various plants were down to a four-day supply. At Cleveland the ingot rate dropped 10 points this week to 79.5 per cent of capacity. Considerable steel was lost in that area when many open hearth furnaces were forced down.

In the Chicago district the embargo was met by reshuffling delivery schedules in order to provide delayed rolling for eastern orders and by storing rolled products on mill floors. The situation there was further complicated by a car shortage which tied up the equivalent of a substantial tonnage of steel production. Long after the present transportation difficulties are clarified, steel mills will still be feeling the effects of the past few weeks' experience with record storms and other production difficulties. At Pittsburgh plant officials were already worrying about the possibility of an unprecedented flood in case a heavy and quick thaw should set in.

Steel order volume this past week continued to mount and order books generally bulged to twice the

size of a month ago, about 50 per cent ahead of the similar period last year. Despite the inability of mills to absorb further tonnage, order directives continued to pour down from WPB on overflowing schedules, particularly for structural steel. Inquiries by WPB into the possibility of an expansion in capacity to break bottlenecks caused by the heavy shell program, disclosed that additional construction, if undertaken, could not become effective for some time—possibly a year. It was reported in Washington this week that Army requirements for the second quarter have been increased 750,000 tons.

If shell steel goals, which have been revised upward repeatedly within the past few months, are met, it is clearer than ever that semi-finished steel, bar, structural and rail programs will have to be further deferred. The revised landing mat program is showing complications with specification that some sheets be pickled and oiled instead of merely hot rolled. If such a specification were to become widespread, deliveries would be delayed at least 90 days from the June dates quoted for hot rolled sheets.

TEMPORARY relief was afforded on plate schedules when the Maritime Commission postponed some deliveries because other components were not readily available. It was made clear, however, that the material was deferred and not cancelled. Meanwhile buyers unable to find takers for their steel allotment continued to raid warehouses. Only recently has the seriousness of the overloaded steel mill condition been appreciated by many buyers who are now depleting warehouse stocks which may not be easily replenished.

The sheet delivery situation becomes tighter each week and carryovers are more acute. Sheet demands for the Army alone are estimated at 60,000 tons per quarter and Navy requirements are mounting rapidly. Talk a few months ago that the sheet picture on the wide strip mills would be bettered has not been borne out.

The War Department this week takes bids on 6500 freight cars for Russia comprising 5000 50-ton flats, 1000 40-ton tank cars and 500 40-ton dump cars. The Army has awarded an additional 161 tank cars (in addition to 200 placed last week) to American Car & Foundry for May and June construction. WPB has authorized the construction of 500 50-ton box cars by Pullman-Standard for the New York, New Haven and Hartford road, and has approved the same quantity for the Pennsylvania Railroad to be made in its own shops. Also approved have been 300 auto box cars for Missouri, Kansas and Texas Railroad at its own shops. A horseshoe manufacturer placed its largest steel order, in recent months, for 3000 tons to be made into horseshoes for liberated Europe.

WEIR ASKS WHITE COLLAR RAISE—E. T. Weir, Chairman of the Board, National Steel Corp., announces that application for authority to increase the compensation of all salaried employees of this company by approximately five per cent is being made to the National War Labor Board and the Treasury Department, the increase to be retroactive to December, 1943. The application covers all salaried employees of National Steel Corp., Great Lakes Steel Corp., Weirton Steel Co., and the Hanna Furnace Corp.

CANADIAN BACKLOGS CLIMB—Canadian steel producers report backlogs in sufficient volume to absorb the greater part of their production capacity to the end of June. Notwithstanding this condition new orders continue to pour in with about 75 per cent of the total coming from the Steel Controller for war requirements. The war business is largely associated with shell and munitions production for the United States' contracts which have been placed with Canadian companies. Most other lines of Canadian war output have been substantially curtailed and there are indications of further reductions on this account before the end of this quarter. Demand for steel on non-war account also is quite heavy, principal buying from railroad car and locomotive builders and agricultural implement companies, which are being given a preference in delivery over other civilian manufacturers.

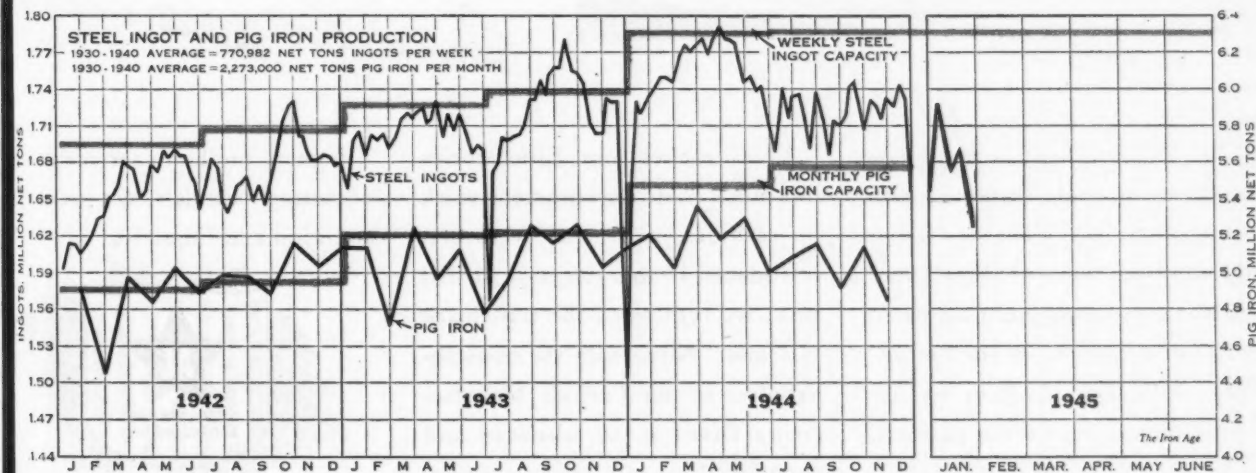
ALLOY STEEL OUTPUT DROPS—Production of alloy steels during 1944 totaled 10,525,436 tons, about 12 per cent of total steel production during the year, according to the American Iron and Steel Institute. In 1943, alloy steel production reached a peak of 13,149,818 tons, almost 15 per cent of total steel output. The decline in production last year reflects decreased demand for military purposes. In December, 1944, alloy steel production totaled 848,274 tons, compared with 803,507 tons in November and 798,647 tons in December, 1943. Open hearth furnaces produced 6,970,975 tons of alloy steel in 1944. The remaining 3,554,461 tons of alloy steel production came chiefly from electric furnaces.

FOREIGN TRADE—Department of State is now permitting private trade with French North and West Africa, the first liberated countries to be so opened up. Similar ac-

tion is expected in the near future in continental France. The Norwegian merchant fleet, halved by war losses, is expected to be a postwar customer of American yards, since British production will be held for their own use. 50 Dutch locomotives ordered in Sweden, are now in production and the first has been completed.

STEEL SCRAP, STOCKS DECLINE—Stocks of iron and steel scrap at plants of consumers, suppliers, and producers at the end of November, 1944, approximated 5,624,000 gross tons, another large decrease from the 5,832,000 tons reported on October 31, 1944, according to the Bureau of Mines. Consumers stocks on November 30 were 4,277,000 tons, compared with 4,536,000 tons at the end of October, while the combined stocks of suppliers and producers were 1,347,000 tons and 1,296,000 tons on the same dates. A further decline in stocks of purchased scrap held by consumers (163,000 tons) was again the important factor in the new loss in total inventories; in addition, stocks of home scrap were reduced 96,000 tons. Dealers stocks rose only 51,000 tons, slightly offsetting the consumer stock decrease. This additional large decline in consumers' stocks of purchased scrap, together with the increase in inventories held by dealers, indicates that some consuming mills still had not re-entered the market to buy material, although the average daily use of purchased scrap was unchanged from October. Since the end of August, when consumers refrained from buying, stocks of purchased scrap held by them have decreased a total of over 450,000 tons in three months.

IRON INVENTORY LIMITATION—Effective Jan. 26, WPB placed a limitation of 30 days' supply on pig iron inventories. WPB said that this was done through issuance of Direction 1 to Order M-17 because of a tight situation in pig iron occasioned by manpower shortages, bad weather conditions and poor quality of fuel. Provision was made in the order that pig iron in transit may be accepted despite the inventory limitation. Also where special needs require more than a 30-day pig iron supply consumers were directed to appeal to the Pig Iron Section of the WPB Steel Division. Division officials said that the new direction will prevent some consumers building up excess stocks when pig iron is urgently needed in other places.



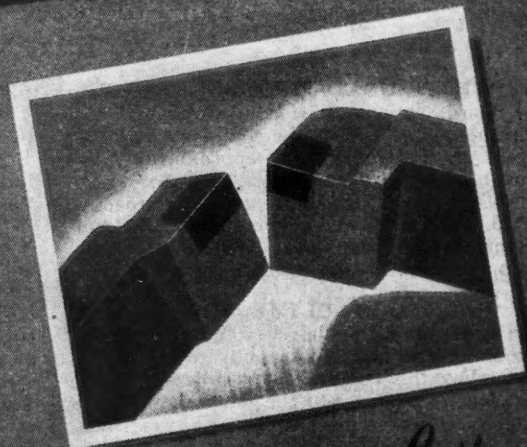
Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
May 23.....	87.0	99.5	89.5	97.0	89.5	93.0	91.0	99.0	96.5	90.5	94.5	94.5	82.5	92.5
May 30.....	86.5	100.0	86.0	95.5	79.5	29.0	91.0	97.0	96.0	92.0	101.0	94.5	95.0	89.5

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Allegheny Ludlum
STEEL CORPORATION

BRACKENRIDGE, PENNSYLVANIA

Rail Embargo Promises Relief for Shortages

Washington

• • • Effects of the drastic three-day railroad embargo will not be known for a week or 10 days, according to officials at the Association of American Railroads, which declared the embargo at the direction of the Office of Defense Transportation. The embargo prohibited the consignment of all except war freight to, through and within the area east and south of the Great Lakes. It was predicted, however, that it would greatly relieve congestion at steel and other war producing plants and see large-scale movements of coal to steel mills where blast and open hearth furnaces have been down by reason of lack of fuel. There will necessarily be delay, it was pointed out, in getting delivery of coal to the East, where cars were not loaded at points west until Saturday or Sunday. But where the movement to Eastern gateways involved only short hauls, quick relief was anticipated.

It was also pointed out some interruption in the shipments of coal occurred because of necessary embargo regulations designed to prevent congestion, which permitted loading at coal mines last Saturday, but prohibited such loading on Monday except in the most urgent cases. On the whole, it was said, that most steel plants weathered this suspension without any great difficulty. It was added, however, that in some areas, such as at Buffalo, conditions were acute and that speedy relief had been requested.

AAR said that it would not estimate the number of cars that had been stormbound and, therefore, it could not say how many had to be "unfrozen," whether it was 200,000 or any other number that had been publicized. Nor was any attempt made as to when bound-up civilian shipments, severely hit by the embargo, would be resumed to so-called normal movement. Effective from midnight last Saturday to midnight Monday of the present week, the embargo was due to continued blizzards and exceptionally heavy snowfall in the affected area which seriously interfered with operation of rail lines.

UNTIEING YARD KNOT:

Probably worst of the rail freight tieups was in Buffalo where a severe coal shortage existed while frozen cars of the same commodity were tied up in the yards. Soldiers with railroad experience were furloughed into Buffalo to help with the shortage of yard crews.



Its purpose was to keep essential lines open for the movement of freight to seaports, freight moving on government bills of lading and other freight certified by the chiefs of transportation branches of Army and Navy to be essential to the armed services.

In appealing to every railroad worker in the affected area, "from President down," to consider himself on extra war duty during the emergency, Col. J. Monroe Johnson, Interstate Commerce Commissioner and ODT Director, directed attention to the "even more serious shipping conditions" that he said would result if "bottleneck" conditions were created at gateways leading into the embargo zone. He warned that if the relief in the section so hard hit by storms is not found to be sufficient, another embargo will have to be issued. Reports to AAR directors indicate that already the snowfall so far this winter in the affected area has exceeded the total of any previous winter.

Col. Johnson expressed the belief that railroads will pull out of the congestion but said that they would need good weather and all the desired effects of latest embargo. He said there was enough freight in the embargo area to bog down every carrier in it. Should subsequent embargoes be found necessary, Col. Johnson indicated that because the country could not stand another drastic three-day embargo such as was declared last week, they would likely be for two days a week.

Asked what further steps might be taken if conditions forced them, Col.

Johnson said that all loading in the country might be stopped for a day or there could be further curtailment of passenger service. He conceded that the latter action would be a great inconvenience and also pointed out that railroads if they think it necessary now have authority to cancel any passenger schedule. This authority has been exercised. A number of passenger schedules have been cancelled to provide extra locomotives and crews to move freight.

Pittsburgh

• • • The rail embargo had a serious effect on steel production in this area, since it cut off completely all incoming rail shipments of coal, limestone and scrap. Coupled with the freight embargo are already existing difficulties caused by fuel shortages, transportation tieups and manpower troubles. The path of the operational departments of the steel producers in this district is very rough.

Carnegie-Illinois Steel Corp. estimated that the freight embargo has cost the company 19,000 tons of steel, all caused by the curtailment of incoming supplies of limestone, scrap, and other raw materials. These shortages have put 45 open hearth furnaces and two electric furnaces out of production in the company's Homestead, Duquesne, and Vandergrift plants. While expectations are that operations of considerable of this down-capacity will be resumed, the coal supplies at these plants are very limited, and any break in its movement

will quickly shut down steelmaking equipment.

The generator at the Carrie furnaces, which has been down for a couple of weeks, has been at least partially repaired, and presently the only operations affected are those classed as "finishing." However, Bessemer equipment was down at the Edgar Thomson works, and other steelmaking equipment was affected by the power breakdown.

Presently, the Clairton works, which is the main supplier of coal to all Carnegie-Illinois Pittsburgh plants, is working on a four-day supply of coal. The coal supply at this plant as late as a week ago was even less than it is now, but a four-day supply is by no means considered adequate.

The fuel oil supplies are also cutting into operations. Three open hearth furnaces at the Carnegie-Illinois Farrell plant have been shut down for some time because of the lack of fuel oil.

Other mills in the district state that the rail embargo, while it has not actually cut into steel production, has made operations difficult, because what is made must be stored until such time as it can be loaded and shipped. With manpower being as tight as it is, double or triple handling of finished products into and out of storage and into cars has slowed down operations.

The rail embargo also has had a bad effect on coal mining, which is one of the most serious problems in this district. Because coal could not be moved from the mines, many mines were shut down during the four-day embargo, and at least 140,000 tons of coal production have been lost. The threat of a coal strike in a month or so plus the fact that all industrial stocks are down is worrying steel mills. Pittsburgh Steel Co. is down to an eight-day supply. Jones & Laughlin has about 15 days supply, but could never operate at capacity for those 15 days because the coal could not be handled fast enough. The rail embargo has made practically all mills dependent upon what can be moved by water.

The seriousness of the coal situation has been brought to the attention of the WPB by the iron and steel industry advisory committee. Expressing grave concern over the expiration of the miners' union contract which expires on March 31, the committee urged that demands of the union be determined and settled be-

fore that date so as to prevent a strike.

Scrap movements, like those of other freight, were stopped by the embargo, and this has proved to be a chief cause in the drop in steel production in this area. However, some scrap was shipped by barge into the National Tube Co. plant at McKeesport, thus averting what would have been a serious curtailment of production.

Meanwhile, snow continues to fall here, thus further hampering transportation and steel production. The stage is now set in the Ohio Valley for the worst flood in history. All it takes is about a week of warm rains, and the 1936 flood level will be an "also ran."

Chicago

• • • District Mills met the embargo by storing material as rolled on mill floors and reshuffling of schedules to provide delayed rolling on Eastern orders. Clearly these expedients were only temporary and preparations were made to curtail finishing operations should the embargo be extended more than five days, beyond the Monday midnight deadline.

One large producer found from 15 to 18 per cent of its output embargo bound. Shipments moved freely, however, to northern, western and southern points. Flat rolled schedules at another mill were shuffled so that eastern orders were delayed a week, other orders moved forward the same period of time.

Although the situation was not gen-

eral, car shortage proved a greater headache than the embargo at the Gary sheet and tin mill of Carnegie-Illinois. There a 500 car shortage tied up the equivalent of one week's production. Curtailment of rolling was anticipated within a week or ten days unless the situation was alleviated.

Producers were also keeping an eye on the effect of the embargo on the coking coal situation. Inventories here run from 15 to 20 days but it was generally felt that prudence would demand curtailment of iron production before this stock was completely dissipated provided the situation did not clear up. The embargo was being rigidly enforced in this category, although in one case a railroad declared its ability to handle shipments from Kentucky mines to the Calumet steel district. One group of company mines, embargoed on shipments to the mill and not having received orders to divert shipments elsewhere was faced with the possibility of a shutdown for lack of outlet for its production. This situation was believed to be only temporary. Inventories of steam coal, averaging about two weeks, were considered adequate in view of permitted shipments from mines to mills within Illinois.

Cleveland

• • • Operations here were severely hampered by the rail freight situation although some mills appeared to be in appreciably better condition than others. While one mill reported that operations this week were continuing "as usual," another reported that it is

ARTILLERY BARRAGE: Soldiers firing 75 mm. Pack Artillery Howitzer at a target 2500 yd. away. This battery fired 1300 rounds in 8 hr., in Myitkyina, Burma.



scheduling this week at about 54 per cent of capacity.

Mills are reported to be using the lost time to effect long delayed repair and maintenance work, and some of the shutdown in the Cleveland district is due to this repair need. Car shortages are affecting this district as well as did the embargo.

Youngstown

• • • Operations in this district are scheduled at 85 per cent of capacity as of the first of the week, although they are subject to later revisions. One large producer has banked one of five blast furnaces, and reduced the blast on the other four. The same plant has closed out two open hearths and suspended operation of two electric weld units and one bar mill.

Another producer in the district took one openhearth out of operation, and further curtailments appeared possible for later in the week.

Buffalo

• • • In this area, where the storms which fostered the rail crisis were centered, the freight snarl was also severe. The steel production for the past week dropped off to 64 per cent of capacity and as of the first of this week, operations were scheduled at 29 per cent, subject to revision if the car situation in the rail yards improve appreciably. It is estimated that capacity should be about 93 per cent.

Two important producers have closed all of their furnaces, while the largest in the area was operating one-third of its furnaces as of Tuesday.

Furloughed railroaders have eased the crew shortage in the yards, but urgent appeals are being made for

help from laid-off war workers to shovel snow in the yards to free cars. Tieups in outlying districts are now causing almost as much difficulty as the situation in Buffalo itself.

A severe and still threatening coal shortage is worrying steel producers as well as other plants in the district, but it is hoped that the effects of the embargo in freeing cars will alleviate this situation.

Detroit

• • • Shipments of axles and material to produce them at the Chevrolet gear and axle plant here were halted by the freight embargo and resulted in a weekend layoff of about 4000 of the 6700 workers at the plant. It was said that the curtailment of production over Saturday and Sunday would not result in any impairment of military needs. So far as was known other Detroit plants were not affected by the embargo inasmuch as comparatively few schedules are currently being worked over the weekend.

Fourth Quarter Report

Pittsburgh

• • • Jones & Laughlin Steel Corp. reports for the quarter ended Dec. 31, 1944 a consolidated net income for the corporation and subsidiaries of \$2,041,634 after all charges. This compares with a net income of \$2,451,647 for the quarter ended Dec. 31, 1943.

Consolidated net income for the year ended Dec. 31, 1944, after provision of \$1,000,000 for contingencies and after all charges was \$7,519,668. This compares with \$9,512,228 earned in 1943 after a \$2,000,000 provision for contingencies and after all

Pipe Shortage Looms For Petroleum Fields

• • • With a threatened 25,000 ton shortage of pipe in the second quarter for the petroleum industry because of increased bomb demand, and an unknown shortage of seamless tubing because of hiked military demands, war agencies have suggested that WPB approve new facilities. Second quarter requirements are 287,000 tons of pipe.

However, one WPB official says if pipe facilities are increased the program will require the building of new open hearths, installation of hot topping equipment, peeling equipment, lathes and man drills and in addition it will be necessary to construct new blooming and bar mills. It was pointed out that this may require too long a time to be of much use in filling pipe requirements this year.

PAW has set a goal for drilling 27,000 new wells this year, and figuring each well will take 41 tons of pipe, the petroleum industry's requirements will be more than 1,000,000 tons. Although PAW authorized the drilling of 32,210 wells in 1944, this year's steel requirements are higher, PAW says, because wells are going to have to be drilled 250 ft. deeper this year than last. This is because oil companies are having to tap more expensive pools to reach petroleum resources.

Tank Contract Goes To Harvester Plant

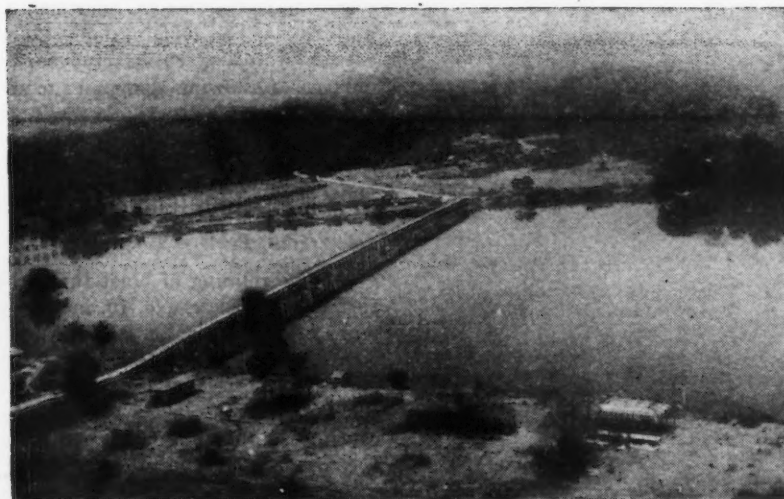
Chicago

• • • International Harvester Co. Monday was awarded a \$45 million contract by the War Department to build medium tanks of the 30 ton General Sherman type, it was announced by Colonel John Slezak, chief of the Chicago ordnance district.

The work will be done at Bettendorf, Iowa, in the quad cities tank arsenal now operated by the Harvester company. Production of this standard medium tank is expected to get under way in June.

The Bettendorf plant was originally built to produce light tanks, but the Harvester company's \$217 million contract with the War Department was terminated in March, 1943, before full production had been achieved. This represented the first major war contract termination of World War II, the settlement of which was completed in July, 1944, for \$25,300,000, or less than 12 per cent of the total amount of the contract.

JAP BACKDOOR TO BURMA: Supplying Japanese troops through Burma, this bridge known as the Wam Kentawng, is 150 miles from Mandalay, over one of the tributaries of the Salween.



Chicago Ordnance Enters Cycle Similar to Pearl Harbor Emergency

Chicago

• • • With their production problems intensified by serious manpower shortages in Chicago and other areas, the Chicago ordnance district's 764 prime contractors and over 13,000 subcontractors have entered a production cycle equally as serious as the emergency period following Pearl Harbor, Colonel John Slezak, district chief, declared here Jan. 25.

"Over 74 per cent of our production in the Chicago district is currently devoted to items classified as 'critical' by the Army Service Forces," Colonel Slezak said. "This compares with 34 per cent six months ago and is indicative of the tremendous responsibility, as well as production load, that private industry must carry at this time."

At present the district has 3091 contracts in effect with a total value of \$3,036,000,000. The district covers the northern half of Illinois and Indiana, the States of Wisconsin, Minnesota, Iowa, North and South Dakota, and the upper peninsula of Michigan.

A major share of the Army's heavy ammunition program has been placed with Chicago Ordnance contractors. By June of this year they are scheduled to have increased their production of 90-mm. shell by 120 per cent;

of 105 mm. shell by 60 per cent; and of 155 mm. shell by 500 per cent. The anticipated large step-up in the output of 155 mm. shell is based on the fact that four new production lines for this item recently went into operation and two more are scheduled to begin production in the near future. Three of these plants are located in Illinois, two in Minnesota, and one in Wisconsin.

Within two months the district will be in production for the first time on 90 mm. armor-piercing shot, with two firms in Illinois, two in Wisconsin, and one in Indiana sharing in this new program. Four of the companies are converting from the manufacture of a smaller size shot, and the fifth is setting up a new line. Colonel Slezak also disclosed that the district's bomb program will be increased substantially in 1945, as will 81 mm. mortar shell production.

The tremendous expenditure of heavy ammunition on the European front has worn out gun and howitzer tubes at unprecedented rates. As a result the district has entered a program which will see tube production in March, 1945, double the monthly figure of half a year earlier. Production of 81 mm. trench mortars attained a rate in December, 1944, which was quadruple the June output. Other

items scheduled for sharp 1945 increases are carriages for 57 mm. anti-tank guns and sighting equipment for all types of artillery.

According to Colonel Slezak, three new tank models rolled off the production lines of the district in large numbers last year. Each new model represents increased firepower and mobility for American armored forces. They include the "Slugger," a 31-ton gun motor carriage whose 90 mm. high velocity gun can fire a 24-lb. armor-piercing shell more than nine miles; the new M24 light tank, the "General Chaffee," which weighs 19 tons, can travel at a speed exceeding 35 miles an hr. and mounts a 75 mm. gun; and the M7B1 self-propelled 105 mm. howitzer which has a General Sherman medium tank chassis.

Combat effectiveness of the General Sherman medium tank, produced in large quantities in the district, has been increased by a new long-barreled 76 mm. gun whose high muzzle velocity gives it a punching power against enemy armor highly superior to the 75 mm. gun formerly mounted on this tank. In mid-1944 the district also came into full production on an amphibious track-laying vehicle, the M29C cargo carrier known as the "Water Weasel."

Colonel Slezak announced that production of finished ordnance material by the district's contractors during 1944 amounted to \$1,672,000,000. Although this represents a decline of \$164,000,000 from the 1943 figure of \$1,835,000,000—due to a number of large contract terminations—the district's output for the present year is expected to surpass all previous figures.

In 1944 the district let \$2,150,000,000 worth of new orders as against new terminations which cancelled work amounting to \$517,000,000. The majority of the terminations, Colonel Slezak stated, were effected for the purpose of allowing companies to start production on new or improved ordnance items.

Relining At Bethlehem

Johnstown, Pa.

• • • The relining of blast furnace K, formerly known as No. 10, in the battery of furnaces at the Franklin operations of the Bethlehem Steel Co., started on Jan. 15, is expected to be completed by March 1. The work is a routine relining, following continuous operations of the unit since the relining in the spring of 1941.

ALL ROADS LEAD TO BERLIN: First Army Engineers lay wire netting for a temporary roadway and bridge across a stream in Belgium.



Crowley Clears Slate With British on 58,000 Lend-leased Tools

Washington

... Pointing out that the transaction is not to be regarded as a precedent, Foreign Economic Administrator Leo T. Crowley on Jan. 25 announced the sale to the United Kingdom of 58,000 American-made lend-lease machine tools, together with attachments and spare parts, for \$31,500,000, or not quite 19 per cent of the original cost of \$166,000,000. The discrepancy between the cost and sales price, however, is not so great as is indicated by these figures since it was pointed out the cost included undisclosed shipments which were lost by enemy action while enroute to England and tools which will be of relatively small value to the British for postwar use. On the other hand it is understood that the cost figure does not include handling and transportation charges.

The amount paid by the British, Mr. Crowley said, is based on depreciation due to the intensive use of the tools under wartime conditions and represents an agreed estimate of the value they will have after they are no longer required for the war effort. Two principal considerations were followed in arriving at the price to be paid—the full American cost price reduced by a standard American depreciation formula for the tools of the type normally procured by the British in the United States and a British price base less appropriate depreciation for tools of a type normally supplied from British production. This is not the same price formula as SWPA has established for standard general purpose machine tools, which provides for discounts ranging from 15 per cent on tools used less than a month to 54.8 per cent on tools used three years or more and sold to buyers who have not been using the tools.

Mr. Crowley said that the past lend-lease use of the tools sold to the United Kingdom for war production purposes will be taken into account in whatever general settlement is ultimately arrived at with respect to lend-lease and mutual aid.

Current United States requirements, he explained, were thoroughly canvassed to determine that no need for these tools exists in the United States at the moment.

"In the past, when war requirements on the western front called for sudden increased war production," he

said, "we called on the United Kingdom for a return of a number of lend-lease machine tools and they were promptly shipped to this country. Now, in purchasing title, the British have agreed to make available to the United States on loan, without cost, such tools as may not be in use should a future war need arise. They have also agreed to withhold the tools purchased from the export market for at least five years after the end of the war with Germany. Should the need arise, they will discuss with the United States the desirability of supplying some of these tools to liberated countries."

The transaction, he stated, resulted from recognition by both Governments of the special problems associated with machine tools, which they felt should be solved in advance of the end of hostilities. In the absence of agreements made under the Lend-

Lease Act, the United States retains ownership of all lend-lease material made available to our allies, Mr. Crowley said. Consequently, he added, British manufacturers were unable to estimate their future tooling needs as long as part of their present equipment was held only on this uncertain basis. It was agreed in this case, therefore, Mr. Crowley stated, in the interest of both Governments, that a special arrangement be undertaken prior to the end of hostilities, which would transfer title to the tools to the British.

"Lend-Lease has provided only a relatively small portion of total United Kingdom machine tools needs," said Mr. Crowley. "During the war the British have installed 459,000 machine tools in their shipyards, aircraft factories, munitions plants and other war industries. Of these, 73 per cent were provided by United Kingdom manufacturers; 14½ per cent were purchased for cash in the United States and the remaining 12½ per cent were provided by the United States under lend-lease."

Decline Seen in 1944 Alloy Steel Output

New York

... Production of alloy steels during 1944 totaled 10,525,436 tons, about 12 per cent of total steel production during the year, according to a report released today by the American Iron & Steel Institute.

In 1943, alloy steel production reached a peak of 13,149,818 tons, al-

most 15 per cent of total steel output. The decline in production last year reflects decreased demand for military purposes.

In December, 1944, alloy steel production totaled 848,274 tons, compared with 803,507 tons in November and 798,647 tons in December, 1943.

Open hearth furnaces produced 6,970,975 tons of alloy steel in 1944. The remaining 3,554,461 tons of alloy steel production came chiefly from electric furnaces.

ENGLISH PASTORAL: A roadside in England has been utilized for the storage of 2000 lb. high explosive aircraft bombs. The bombs are received from Ordnance Arsenals in the United States and stored by Ordnance ammunition companies.



Krug Outlines New Program To Increase Overall War Production

Washington

• • • A five-point program designed to increase war production was announced recently by J. A. Krug, Chairman of the War Production Board. The program has been approved by the Army, Navy and other procurement agencies as well as by the War Manpower Commission and the War Production Board, Mr. Krug said.

Under the plan:

1. All prime contracts requiring additional labor over the producer's current WMC ceiling will be subject to Production Urgency Committee approval before they can be placed in a locality designated as a Group I labor area by WMC.

2. All subcontracts for Class A products involving \$100,000 or more requiring additional labor over the current WMC ceiling, will be subject to Production Urgency Committee approval before they can be placed in a locality designated as a Group I labor area.

3. No spot authorizations will be made in any Group II labor areas unless they are unanimously approved by the Production Urgency Committee concerned.

4. Restrictions on construction will be strengthened.

5. Full support will continue to be given to WMC's employment ceiling program, which went into operation July 1, 1944.

The first point in the program is the result of a joint agreement between Army, Navy, WMC and WPB. Under this agreement, procurement officers in all Group I labor areas will report all contracts of \$100,000 or more (including renewals) to the appropriate Production Urgency Committee as far in advance of placement as possible, but at least seven days before placement unless this will unduly delay production. In cases where production might be delayed, the procurement officer will report to the committee as soon as is practicable before placement.

Approval of Production Urgency Committees will be required for placement of prime contracts, regardless of dollar value, only in instances where the producer will require an increase in labor above the WMC ceilings.

Rules relating to subcontracts are contained in a new Controlled Materials Plan Regulation No. 10. This regulation supplements controls on

Class A products that are exercised by the Army, Navy and other procurement agencies over the placement of contracts.

Class A products are those for which manufacturers make application to their customers for allotments of copper, steel and aluminum, with which to carry on production.

According to the regulation, which becomes effective February 12, 1945, a manufacturer may not accept an order for Class A products (other than certain specified categories) for more than \$100,000 to be made in any area that is classified as a Group I labor area, WPB officials said, if he will require manpower in excess of his existing WMC ceiling unless he has received approval from the War Production Board on Form GA-2260 for acceptance of such an order.

Applications for permission to accept purchase orders in Group I labor areas in excess of \$100,000 will be acted upon by WPB's local Production Urgency Committees. In order to have a PUC act on an application, the person receiving such an order must file the following information with the local district office of WPB:

(1) A description of the amount of the order, the proposed schedule de-

liveries against the order, and a brief identification of the Class A product or products covered by the order.

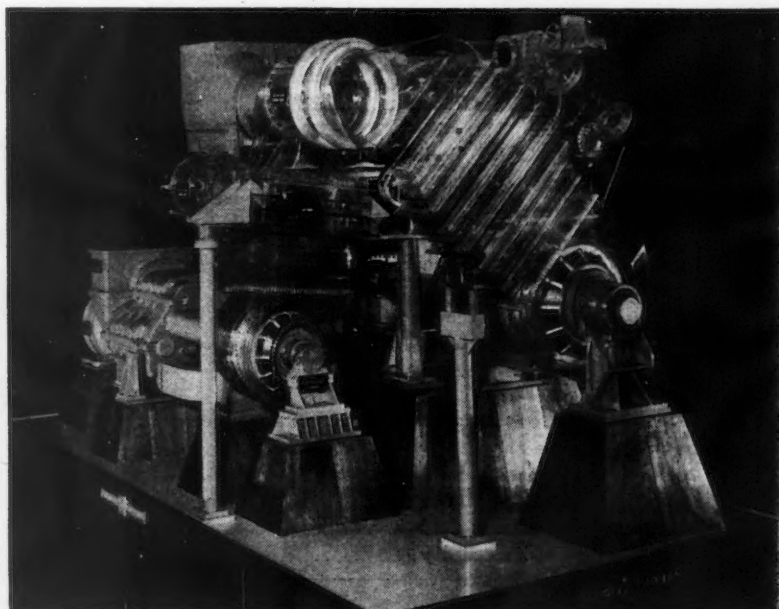
(2) The name and address of the customer and such information as is available regarding the end use of the product.

(3) A specific statement as to how much manpower will be required in excess of applicable War Manpower Commission ceiling in each month in order to fill the order.

This new procedure applies to all contracts, purchase orders, "releases," delivery orders (including an order providing for a later "release" of specific quantities of products at specific times), increases or accelerations of production or delivery schedules, or other requests from a customer for delivery either in larger quantities or at earlier dates than previous schedules called for, in all except certain specific exceptions.

Manufacturers who are unable because of the new CMP Regulation No. 10 to place their purchase orders with competent supplies, may apply for relief. If the product is required for incorporation in another Class A product manufactured on a contract of the Army, Navy or United States Maritime Commission, application for relief should be directed to the service concerned. If the Class A product is for inclusion in a Class B product, application for relief should be made to the appropriate WPB industry division. In all applications for relief, the

GAS TURBINE: By exhibiting at Navy Pier, Chicago, this quarter-scale transparent model of a gas turbine built and now under test by Elliott Co., Jeannette, Pa., the Navy Department reveals some of the construction details of this new and much discussed prime mover.



persons seeking to place his order should indicate the name and location of all companies with which he has tried to place it.

The new regulation specifically prohibits a manufacturer from splitting orders for Class A products covered by it in order to evade the restrictions it imposes on order placement.

The rules relating to spot authorizations in Group II labor areas is an extension of the agreement that was announced by the Army, Navy, WMC and WPB on December 1, 1944. At that time, it was announced that spot authorizations would not be made in any Group I area and in certain Group II areas without the unanimous approval of the Production Urgency Committee of the particular locality involved.

Full details on the method to be used in further restricting construction have not as yet been worked out. However, the Army, Navy, WMC and WPB have agreed to take such action.

In connection with the fifth point in the program, to give continued full support to WMC's employment ceiling program, it was pointed out that reports from Allentown, Pa., and other areas throughout the United States indicate that this program is proving effective in transferring workers from non-war employment to critical war jobs. Both WMC and WPB feel that the program should be given all possible support to bring about early victory.

Rich Upper Silesia Steel And Coal Centers Falling to Russians

By JACK R. HIGHT

New York

• • • Russian Army drives occupying major areas of Upper Silesia have neutralized all of the important steel and coal producing centers of that German province. Nearly all of the large industries of pre-Nazi days stand within 15 mi. of the 1939 Polish-German border, west of the Oder River.

Capture of this economic prize has placed the second most important Reich industrial area in Russian hands. The industrial Ruhr, largest German industrial concentration, has long been the favorite victim of Royal Air Force and American heavy bombers, but Silesia, out of their range, has operated almost unscarred throughout the war. Russian strategy, either by choice or necessity, has not included the use of long range strategic bombardment, a fact that also protected the long established blast furnaces and coal fields of the central European province.

Developed during the eighties by German capital and under Prussian domination, the industrial concentration was an outgrowth of early development of rich iron ore deposits and coal in close proximity. Deposits on both sides of the upper regions of the

Oder River have been exploited, but the richest developments have historically been on the west side of the river. The fact that the laboring group in both mills and mines has been predominantly Polish in language and descent has made the region a political football, and made it one of the centers of the Geneva Convention's "self-determination" experiments in 1922, when the richest areas were ceded to Poland. Nazi Germany made this area one of its most important pre-war goals, and managed to take it into the fold in 1938.

Silesia's greatest importance to Germany is in her coal reserves, and although no up-to-date statistics are available, the reserves have been estimated to be only slightly less than those of the whole of England. In the twenties it was estimated to be over 50 billion tons. Pre-Nazi production did not appreciably exceed 35 million tons, in the region known as Upper Silesia, thought to furnish 25 per cent of Germany's coal.

The original iron and steel industry suffered before World War I when German ore mines became exhausted, but annexation to Poland made reserves there available, and German capture of Polish supplies early in this war furnished adequate supplies of high grade ore. Steel production is considered to be the second most important activity of modern Silesia, followed by production of several non-ferrous metals.

About 10 per cent of the world's supply of zinc in pre-war days came from this area, closely following United States and Belgium in this category. There has been considerable lead production and some silver production, and a strong chemical industry since the turn of the century.

Despite the lack of reliable information, it has long been conjecture that many of Germany's vital industries have been transported to this region where they were safe from ravaging bombers, and it is possible that Silesia is an even richer industrial prize than pre-war estimates of its relative worth would indicate. The power potential is sufficient for large transplantations of industries to have been accomplished, and the Reich's slave labor tactics have modified the need for a large labor supply in the area.

STEEL SHOES: To give a better grip on soft, muddy ground, the tracks of British tanks are being widened 6 in. by adding a steel shoe to each link. This enables the tanks to negotiate ground that previously bogged them.



Canadian Steel Backlogs Swell As U.S. Places War Contracts There

Toronto

• • • Canadian steel producers report backlogs in sufficient volume to absorb the greater part of their production capacity to the end of June. Notwithstanding this condition new orders continue to pour in with about 75 per cent of the total coming from the Steel Controller for war requirements.

The war business is largely associated with shell and munitions production for the United States' contracts which have been placed with Canadian companies. Most other lines of Canadian war output have been substantially curtailed and there are indications of further reductions on this account before the end of this quarter.

Demand for steel on non-war account also is quite heavy, principal buying from railroad car and locomotive builders and agricultural implement companies, which are being given a preference in delivery over other civilian manufacturers. Inquiries and new order placing for steel by electrical equipment makers has been more pronounced of late and while producers are accepting this type of business they are making no promise regarding delivery.

Over the past month or six weeks both production and deliveries of steel by Canadian mills have been rather seriously interrupted by adverse weather conditions which have created numerous transportation problems and hundreds of cars of freight

have been unable to move and in many instances trucking has been suspended because of blocked roads by the heavy snowfall. These conditions were further aggravated during the past ten days when fresh snow clogged the roads in the Hamilton-London-Windsor districts.

While Government officials continue to complain of labor shortage there does not appear to be any great scarcity in the Toronto area. Thousands of workers recently let out from various war plants in this field are seeking new employment through National Selective Service, and many complaints are heard to the effect that they are unable to find satisfactory work. The type of workers, however, in the majority, are not satisfactory for steel mills, with the result that this essential industry has been unable to fill its ranks and maintain anything like capacity production schedules.

At the present time steel mills are operating about 85 per cent. Bar and sheet mills are running close to full time and these departments are plugged with orders which will take care of their entire capacity for the next six months. While much of the business in bars is credited to shell production, local mill representatives state that bar bookings as a whole cover all sizes.

Steel imports from the United States have been showing some improvement of late and it is stated that further gains in this direction will

develop before the end of this quarter. Steel plate demand appears to be gradually tapering off and mills now are offering delivery in six weeks to two months. There has been slowing down in plate demand on shipbuilding account, and some of this slack has been taken up by heavier buying by car, locomotive and implement makers.

A serious shortage has developed in wire and nail supply and at least one large producer in this area refuses to take further orders, even from old customers.

Apparently much of the renewed interest in the Canadian steel markets which has resulted in a heavy outpouring of orders both for spot and future delivery, is due to the fact that some consumers here believe there will be an early boost in prices. This condition has developed since the announcement of advancing prices in the United States.

Ingot Producer Uses Induction Melting

Pittsburgh

• • • The American Metal Co., Ltd., is now operating a recently installed furnace at the Pittsburgh plant of its subsidiary, the Duquesne Smelting Corp. for conversion of shell cases and other metal scrap into low and high-tensile manganese bronze ingots. In discussing the use of the electric furnace, R. H. Graves, works manager of the Duquesne Smelting Corp., said, "To the best of my knowledge, we are the only ingot smelter operating this type of furnace for this purpose, except the manufacturer of the furnace, who also produces brass and bronze ingots."

Restrictions Relaxed On Use of Steel And Iron in Truck Bodies

Detroit

• • • Special limitations on the use of iron and steel in truck and trailer bodies have been removed through the revocation of Order L-253, the War Production Board announced recently.

However, amendment No. 4 to Order M126, also issued, prohibits the use of stainless steel in truck and trailer bodies except in milk trucks and refrigerator-type trucks. Iron and steel available for truck and trailer bodies, other than stainless steel and galvanized sheets will be subject to the regular allotments.

PRIVATEER TO PATROL: The Navy's new Privateer, a sea-going sister to the Army's Liberator, has been used for patrol, search and bombing operations in the war against Japan. The plane retains the Consolidated Vultee wing and in addition has the single rudder and 12 additional feet of length in the nose.



Military Needs Place Drastic Limits on Spot Authorization Plan

Washington

••• Warning has been given by WPB that because of military needs use of the spot authorization (PR-25) order has been drastically limited and that it is unlikely that mill orders for steel, copper in most forms and aluminum sheets placed under the order will be filled during the first quarter and perhaps the second. However, allotments and authorizations that have been granted have not been cancelled.

Spot authorization still can be approved to utilize any amount of idle and excess material provided the applicant has available facilities and labor. No new allotments will be made of copper wire mill or brass mill products and new allotments of steel will be limited to not more than 10 tons of carbon and two tons of alloy steel to "piece in" idle and excess materials. No limit has been placed yet on new allotments of aluminum.

Of the two additional severe limitations placed upon the functioning of PR-25, one concerns the "four power pact" issued Dec. 1, 1944, and signed by the Army, Navy, WMC and WPB. Field representatives of these agencies in all areas of critical labor shortage, plus 44 in other areas centering about major manufacturing cities, were ordered by this document to grant no spot authorizations for 90 days except in unusual cases. Also warehouses, now the best source of new materials for "spot authorizations," have been limited in the amount they can deliver on "Z" allotments (orders on an unrated basis) as follows:

Steel—Distributors have been directed to deliver only 10 tons of carbon steel and two tons of alloy per customer each quarter, and customers are limited to a total of those amounts on "Z" allotments. Stainless steel deliveries have been stopped entirely. "Z" allotments orders may still be placed with mills, but it is extremely unlikely that they can be filled because regular CMP orders come first. "Z" orders on mills are not limited in tonnage as are the allotments to be filled from warehouses.

Copper—Purchases of brass mill products from warehouses under

PR-25 authorizations are limited to 200 lb. per quarter. For copper wire, the quarterly limit that can be purchased from warehouses is 50 lb.

Aluminum—No more than 1000 lb. of aluminum sheet, strip and plate may be bought from warehouses per quarter. At the mill level, the supply situation is so tight it is unlikely that

J & L Appeals on Plant Guard Union Problem Pittsburgh

••• The Jones & Laughlin Steel Corp., last week, appealed to the Federal District Court of the District of Columbia to declare that the United Steel Workers of America, CIO, has no legal right to recognition as a bargaining agency of plant guards or police, and that the War Labor Board has no right to require the company to recognize the union, or enter into a contract with it, covering plant protection employees.

The company is in a somewhat confused position, by contradictory orders of the courts and the WLB. In the case of the Otis Works, the United

many deliveries will be made on "Z" orders.

A manufacturer who has a "spot authorization" is prohibited from ordering more than these amounts from warehouses in any quarter. These new restrictions are contained in Direction 6 to CMP Regulation 4, which was announced recently.

When a manufacturer needs more material than the amounts listed above, he may make an appeal to WPB in Washington as a special hardship case.

States Circuit Court of Appeals for the Sixth District ruled in December that the National Labor Relations Board could not enforce an order directing J & L to bargain with the steel workers, in so far as their plant guards were concerned.

The court maintained that these employees might find themselves in the position of enforcing rules or regulations against members of their union, and held that the imposition of such strains upon "personal allegiance and personal interest would undoubtedly be detrimental to public interest and free flow of commerce."

In a more recent case, involving Pittsburgh Works police and guards, the National War Labor Board held there was nothing in the laws that deprives plant protection employees "of their right to a determination of terms and conditions of employment by this board." And, held that the Otis Works court ruling did not govern the Pittsburgh Works case. It upheld the directive of the third regional WLB, requiring J & L to enter into an agreement with the USWA-CIO.

QUALIFICATIONS INVENTORY BLANK

Fill in and mail to Orville E. Reed, 122 S. Iabell St., Howell, Michigan

What you tell about yourself here is all the information I will have in preparing the letter to present your qualifications to prospective employers. Please try to make this a complete and detailed inventory of your experience, education and abilities. Where insufficient space is allowed in which to say everything you may want to say about any phase of your qualifications, turn the blank over and write in as much detail as you desire. Or use a separate sheet of paper.

Within a reasonable time after this returned to me I will mail you a letter with qualifications which you can copy, or prospective employers. The purpose is to "sell" your services to employers.

There is no charge for this service implied.

Name _____

Street and Number _____ City _____

Age _____ Height _____ Weight _____ Color _____

Any outstanding physical characteristics? _____

Married or single _____ Children: Boys _____

Education High Schools: Where attended _____

College: Where attended _____

Did you graduate? _____ What degree, if any _____

State here what courses you took in high school or college that provided specialized training: _____

State what special education you have had such as correspondence courses, night school: _____

Experience Note below names and addresses of employers and dates you worked for them.

Company	Period of Employment	Type of Work
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Give below any additional information about the above positions: _____

The Position You Seek Tell me what you are looking for. "Engineering" or "Selling" but be more definite. Write the back of this blank, if necessary, to _____

VETERAN'S ASSISTANCE: As a practical step to aid returning veterans, Orville E. Reed of Howell, Mich., is writing letters of application gratis for servicemen who fill out a qualifications blank.

Bethlehem Operating Rate Drop Caused by Manpower Shortage

New York

• • • For the first time since the second quarter of 1940, the Bethlehem Steel Co.'s operating rate dropped below 100 per cent of rated capacity. Because of manpower and raw material shortages, current steel ingot production is approximately 95 per cent of capacity, according to E. G. Grace, president.

With coal supplies critical because of the transportation situation, Mr. Grace suggested that in order to keep the mines open the government should now insist on having before it the demands the United Mine Workers will make upon the expiration of the union contract on March 31.

Net income of the company for 1944 amounted to \$36,167,723, compared with \$32,124,592 in 1943. Net current excess assets over liabilities on Dec. 31, 1944, totaled \$291,500,000, while on the same day in 1943, this figure was \$220,500,000. The total payroll for the year 1944 was \$847,354,000, including adjustments for the retroactive wage increase, compared with \$896,143,000 in 1943. Average hourly wages were \$1.376 in 1944 and \$1.321 in 1943. The number of employees dropped from 250,761 in the third quarter of 1944 to 239,765 in the last quarter. During the fourth quarter of 1943, the number of employees was 294,120.

A dividend of \$1.75 per share was declared on the seven per cent cumu-

lative preferred stock, payable on April 2, 1945, and a dividend of \$1.50 per share on the common stock, payable on March 5.

No more new work is planned for Bethlehem's Hingham Yard, Mr. Grace said, which will close in August. Many of the 13,000 men employed at

that yard will be transferred to the Quincy Yard and to the repair yards in Boston. According to present schedules, the Quincy Yard will operate at full capacity to the end of 1947, building heavy ships for the Navy. The Staten Island Yard will be scheduled to build destroyers to the end of 1946 and shipbuilding on the West Coast is being curtailed, preference being given to repair work. Facilities are now being added to handle this work.

Dravo Gets Shell Building Contract Let by Ordnance

Pittsburgh

• • • Arrangements have been completed for the manufacture of 75 mm. artillery shell at the Dravo Corp., Neville Island, according to Colonel Robert C. Downie, district chief of the Pittsburgh ordnance district, today. Production of shell will commence just as soon as necessary alterations can be made to existing buildings and the machinery and equipment can be installed. Machine tools and equipment in excess of \$3,000,000 will be required.

The production of shell is another contribution to the war program by the Dravo organization. Dravo has done an outstanding job in the production of landing craft and other vessels in the Navy Shipbuilding program.

In commenting on the additional work being taken on by Dravo at this

time, Colonel Downie said—"Increased demands from General Eisenhower and other theater commanders, require additional facilities for artillery shell. The import and outstanding job that Dravo has done in the shipbuilding program is well known to all of us. We are fortunate that Dravo is able to take on this shell contract. It is a big job which must be done quickly. In placing the contract with Dravo, we do so with confidence that production will be obtained in the shortest possible time."

Dravo this week announced that it is closing its Hunter plant at Neville Island where about 250 are employed. The plant was leased from Hunter Steel Co., in the early part of the Dravo Shipbuilding program and has been used as a fabricating shop for the shipyards.

All personnel with prior service with Dravo will be transferred to other Dravo operations and the remainder will be released for priority work in other war plants in the district.

PIG IRON SUPPLIES BECOME TIGHTER: *The trend in pig iron demand continues to become tighter as some districts find supplies far less plentiful than was the case of a few months ago. Repair cycles and manpower are a few of the factors that have kept the capacity rate on blast furnace production at a relatively low rate. Last December blast furnaces operated at an average rate of 86.7 per cent of capacity.*

Blast Furnace Capacity and Production—Net Tons

	Number of Companies	Annual Blast Furnace Capacity	PRODUCTION							
			PIG IRON		FERRO-MANGANESE AND SPIEGEL		TOTAL			
			December	Year to Date	December	Year to Date	December	Year to Date	Per Cent of Capacity	
									December	Year to Date
DISTRIBUTION BY DISTRICTS:										
Eastern	10	12,749,570	896,258	11,061,662	17,033	260,223	915,291	11,321,885	84.9	88.6
Pittsburgh-Youngstown	15	28,870,760	1,975,606	25,019,907	20,017	234,548	1,995,623	25,254,455	87.8	94.0
Cleveland-Detroit	7	6,620,500	508,945	6,220,327			508,945	6,220,327	90.9	94.0
Chicago	7	14,063,510	1,052,500	13,106,488		8,780	1,052,500	13,115,268	88.5	94.9
Southern	8	5,039,470	348,126	4,131,686	20,028	177,223	368,154	4,308,919	86.4	89.2
Western	4	2,841,100	158,244	1,718,620			158,244	1,718,620	65.9	65.9
TOTAL	35	68,184,910	4,941,679	51,258,700	57,078	680,774	4,998,757	51,939,474	86.7	91.7

During 1943 the companies included above represented 99.5% of the total blast furnace production as reported to American Iron & Steel Institute.

Industrial Briefs . . .

• **GRANT APPROVED**—A \$382,000 grant by the Defense Plant Corp. to the Lake City Malleable Co., Ashtabula, Ohio, for construction of a new service building has been approved, according to J. H. Redhead, president of the company. Part of the money will be used to complete the \$3,360,000 plant.

• **HONORARY MEMBER**—In recognition of his outstanding accomplishments as the leading engineering authority on the Great Lakes, Louis C. Sabin, vice-president of the Lake Carriers' Association, was the recipient recently in New York of honorary membership in the American Society of Civil Engineers, becoming one of a select group of 37 men holding this honor.

• **SELLS INTERESTS**—N. M. Salkover has disposed of his interests in the Queen City Steel Treating Co. and the Cincinnati Mine Machinery Co. to E. P. Stegner, president, his wife and A. O. Bristol, an executive of the latter company.

• **LARGER QUARTERS**—The Lincoln Electric Co.'s Peoria office is now located in larger quarters in the Electrical Building. L. W. O'Day remains as manager.

• **NO EXCESSIVE PROFITS**—Thirteen subsidiaries of U. S. Steel Corp., whose war contracts are subject to renegotiation under the Federal renegotiation statute, have been notified by the Navy Price Adjustment Board that no excessive profits under these contracts were realized by these companies in 1943. In the case of Federal Shipbuilding & Drydock Co., the renegotiation proceeding for 1943 resulted in a reduction of \$4,500,000 in the selling prices of ships.

• **AWARDED FOR SERVICE**—William A. Irvin, a member of the board of directors and finance committee of U. S. Steel Corp., has received the Gary Medal in recognition of 50 years of ser-

vice in the corporation and predecessor companies.

• **INCREASES OUTPUT**—American Can Co. has scheduled an increase of more than 100 per cent in production of machine gun cartridge belt links with an average minimum monthly output of 30 million slated for 1945.

• **ELECTS OFFICER**—Felix Edgar Wormser has been elected acting secretary and treasurer of the Metal Powder Association.

• **BUYS MOTOR CORP.**—Pacific Car & Foundry Co., Seattle and Renton, Wash., has acquired controlling interest in the Kenworth Motor Truck Corp., Seattle, manufacturers of heavy duty trucks and bus chassis.

• **WELDING COURSE**—Designed to set forth in an understandable manner how welding processes differ, how electronic control for resistance welding works and how this method of control extensively adapts this welding process to industry, a new seven-part training course, including slide sound films, has been prepared by Westinghouse Electric & Mfg. Co., Pittsburgh.

• **LARGE ADDITION**—Advance Pressure Castings, Inc., Brooklyn, has purchased a building adjoining their present plant, extending 40,000 sq. ft. to their present floor area.

• **ORGANIZES COMPANY**—Jones Machine Tool Co., Cincinnati, has been organized and incorporated with a capital of 250 shares of no-par common stock. Principals of the firm are listed as Harry C. Jones, William F. Meyer and William F. Jones.

• **NAZIS TO WORK**—Signal Battery Corp., Milwaukee, is making arrangements to equip one of the hangars at Billy Mitchell flying field, with machinery for assembling batteries so long as this item is critical. Between 1000 and 1500 German prisoners of war will be employed just as soon as Washington confirms the arrangement.

SEASON 1944

Grades of Lake Superior Iron Ore
Shipped By Lake

In Gross Tons

(Cargo Bill-of-Lading Weights*)

SUMMARY

TOTALS—BY RANGES

	Tons	Per Cent of Total
U. S. RANGES		
Mesaba.....	61,308,616	76.29
Vermilion.....	1,419,708	1.77
Cuyuna.....	2,208,382	2.74
Total Minnesota.....	64,931,676	80.80
Gogebic.....	5,523,061	6.87
Marquette.....	4,656,358	5.80
Menominee.....	4,757,142	5.92
Total Michigan-Wisconsin.....	14,936,561	18.59
Total U. S. Ranges.....	79,868,237	99.39
CANADIAN		
Michipicoten.....	474,405	.59
Steep Rock.....	16,248	.02
Total Canadian.....	490,653	.61
GRAND TOTAL.....	80,358,890	100.00

TOTALS—BY GRADES

	Tons	Per Cent of Total
U. S. RANGES		
Non-Bessemer.....	60,111,928	74.80
Bessemer.....	16,884,758	20.99
Manganiferous.....	2,318,820	2.89
Siliceous.....	540,740	.67
Aluminiferous.....	31,991	.04
Total U. S. Ranges.....	79,868,237	99.39
CANADIAN		
Bessemer.....	490,653	.61
GRAND TOTAL.....	80,358,890	100.00

* Bill-of-lading weights are 1% less than upper lake railroad weights.

Source—The Lake Superior Iron Ore Association

COMING EVENTS

Feb. 26-March 2—A.S.T.M. 1945 Committee Week, Spring Meeting, Pittsburgh.
April 4-6—SAE National Aeronautic Meeting, New York.
April 12-14—Electrochemical Society, Inc., Philadelphia—Atlantic City Congress, Atlantic City, N. J.
April 26-27—Annual Conference, Open-Hearth Steel Committee and Blast Furnace and Raw Materials Committee, Iron and Steel Division, A.I.M.E., Chicago.
April 30-May 4—American Foundrymen's Association, Detroit.

CANCELLED

Feb. 8-9—American Society of Lubricating Engineers Convention, Chicago.
Feb. 19-22—Annual meeting, Iron and Steel Division and Institute of Metals Division, A.I.M.E., New York.
March 19-22—American Society of Tool Engineers, Cleveland.
April 30-May 4—American Foundrymen's Association, Detroit.

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Write for Crane or Hoist catalogs and investigate Euclid equipment before placing your next order!

THE EUCLID CRANE & HOIST CO.
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WASHINGTON

Washington

(CONCLUDED FROM PAGE 76)

space and took about 4,000,000 man hours to complete.

The inventory has accomplished a great deal. For example, about \$1,000,000 worth of material in standard stock has been distributed within the Navy, thereby saving new procurement of that material. Without the inventory this saving would have been impossible. Ease in filling requisitions has also been reported.

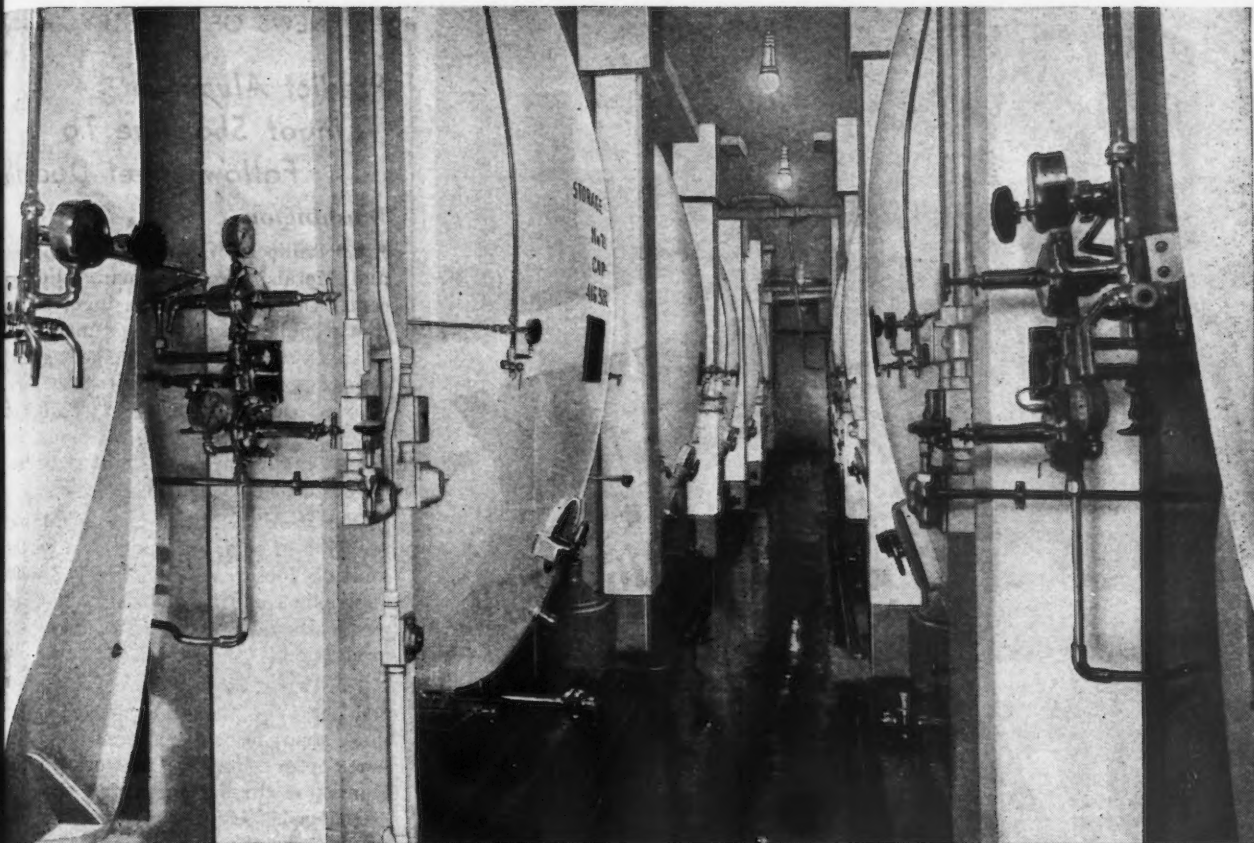
One of the other directives that were issued by the Secretary required the examination of all outstanding contracts to determine whether everything on order was actually needed. Since August, 1944, this has resulted in the reduction of contracts amounting to \$441,000,000.

This physical inventory is regarded by the Navy as only the foundation of the Inventory Control system. Admiral Irish says: "It provides the material by which the Bureau can find out what they have so when they make procurements, they can tie it with what they actually need. During this coming year our efforts are going to be directed toward establishing each Bureau and throughout the whole of the Naval system tight inventory control systems so that procurement will be definitely tied up with what we need."

In addition to providing the Navy with a complete accounting of field stocks, the inventory had the following beneficial results, according to procurement officers:

1. Disclosure of material "not on charge," misplaced or inadequately and improperly stowed.
2. Identification of improperly or inadequately described material, particularly non-standard items, and the contribution of valuable information to the project of cataloging Navy material.
3. Focused attention on inadequacies or failures in procedures in maintaining stock records.
4. More efficient utilization of storage space through improvement in storage and housekeeping.
5. Facilitation of determining excess and obsolete materials.

The inventory did not cover overseas areas. Inventory control is maintained overseas, but once stores leave the United States the Navy considers them as expended. Under the provisions of the Surplus Property Act overseas surpluses will not be returned to this country.



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a new SMITHway Certified Electrode that produces a gas-free, quality weld and permits uniform fusion of the glass lining, even over the welded areas.

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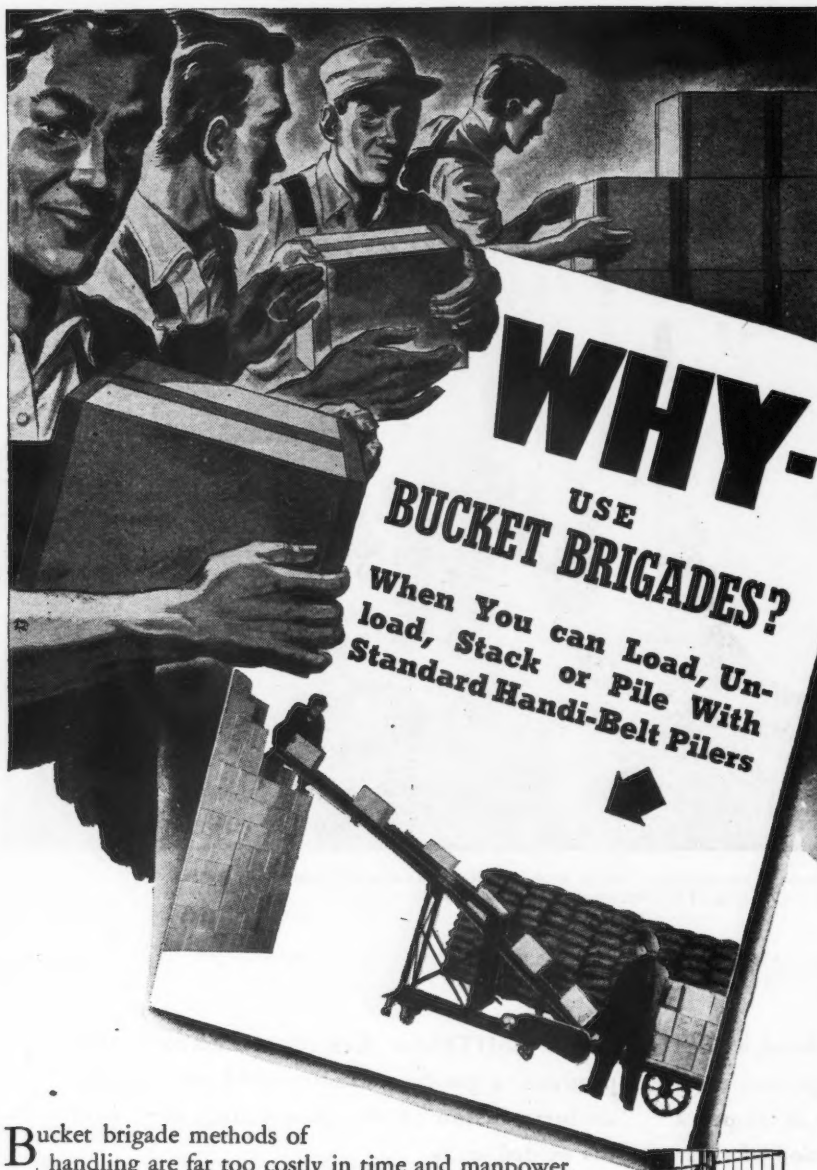


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Predict Aluminum Ingot Shortage To Follow Sheet Dearth

Washington

• • • Philip D. Wilson, WPB Minerals and Metals Vice-Chairman, said recently that the aluminum ingot situation would not get serious until June of this year, but that the sheet situation is getting tighter with a first quarter deficit of 50,000,000 lb. of sheets. By June, the government ingot stockpiles are expected to be reduced to 250,000,000 lb.

Plenty of facilities are available, Mr. Wilson said, but manpower is the limiting factor. A shortage of 9000 men exists in the industry, 5000 of which should be channeled to sheet production.

The Army Service Forces will furnish half of the men needed from those about to be discharged from the Air Corps. Men are to work in the plants for three months and then be discharged. Air Corps furnishes the men on the theory that it is the aircraft program which is the biggest user of aluminum.

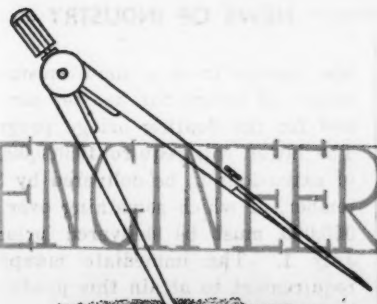
Aluminum sheet order books have been frozen indefinitely, it was said. Output of aluminum products is expected to be 275,000,000 lb., approximately 100,000,000 lb. less than indicated requirements.

While WPB will not insist upon filling requests for allocations by products in conformity with previous practice before bulk allotment was authorized last year, Mr. Wilson said that the Air Corps will breakdown aircraft orders into seven products in screening requirements for various producing companies.

The excess order load is assumed to reflect a maldistribution of the total aluminum allotment, which was based upon the extreme reduction of aircraft inventories during the fourth quarter, accelerated programs and the insertion of new and urgent programs such as the M-4 Bridge Project and Jettison Tanks.

If the consumption of aluminum sheet by aircraft plants in the fourth quarter of 1944 reflected the increase that is shown in the W-12 Aircraft Program, inventories of aluminum sheet in the hands of these manufacturers are resultantly at their lowest level since the middle of 1942.

Next to aluminum sheet, extrusions present the most critical problem and indications are that the heavy presses will be taxed to capacity. The prob-



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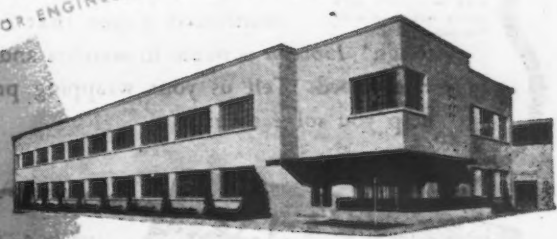


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lem results from a simultaneous increase of orders for heavier aircraft and for the floating bridge program. The latter will require 40,000,000 lb of extrusions to be delivered by September, of which something over 35,000,000 must be delivered prior to July 1. The immediate manpower requirement to attain this production is 2200 men.

Every effort has been made to distribute the task through the entire system in the following manner:

1. To fully utilize every available large press in the extrusion plant now operating.
2. Transfer of the two large presses from Cressona to Phoenix, Arizona.
3. The use of the two large presses at Halethorpe and Canton, belonging to Revere Copper & Brass Co.
4. The proposed use of the large press in the former Extruded Metal Defense Plant Corp. plant at Grand Rapids, Mich.

Orders for aircraft forgings have increased slightly over stated requirements and the recently accelerated ammunition program has effected a substantial increase in the demand for press forgings. No serious difficulty is anticipated in meeting the task although, owing to the nature of the fuze forgings, certain plants are taxed to their productive capacity and it is estimated that 300 men are urgently needed.

The order load for impact extrusions has substantially increased and is at a higher level than at any time during the last year. Present facilities are taxed and efforts are being made to establish other sources of supply. No specific knowledge is available as to additional manpower requirements, but we estimate 100 men

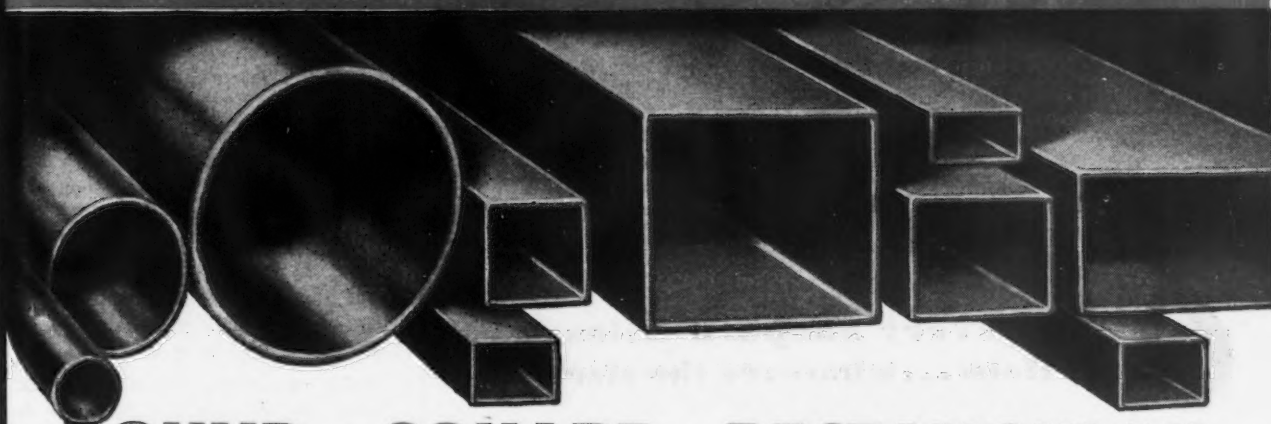
At present, a surplus capacity of 10,000,000 lb. per month of atomized powder exists over currently known actual requirements. However, a potential demand of an additional 30,000,000 lb. a month is being contemplated which will involve the building of new facilities and a manpower requirement of 500 men.

The two major producers of aluminum flake and paste now have a 90-day backlog, and there are rumors of demands for substantially larger amounts. If the latter develop, 150 men will be promptly required.

Shipments of rod and bar have been falling off gradually and are much less than the amounts actually being consumed by forge shops. A 40 per cent increase in the demand for rod and bar may materialize in the early part of 1945 if forge stock in-

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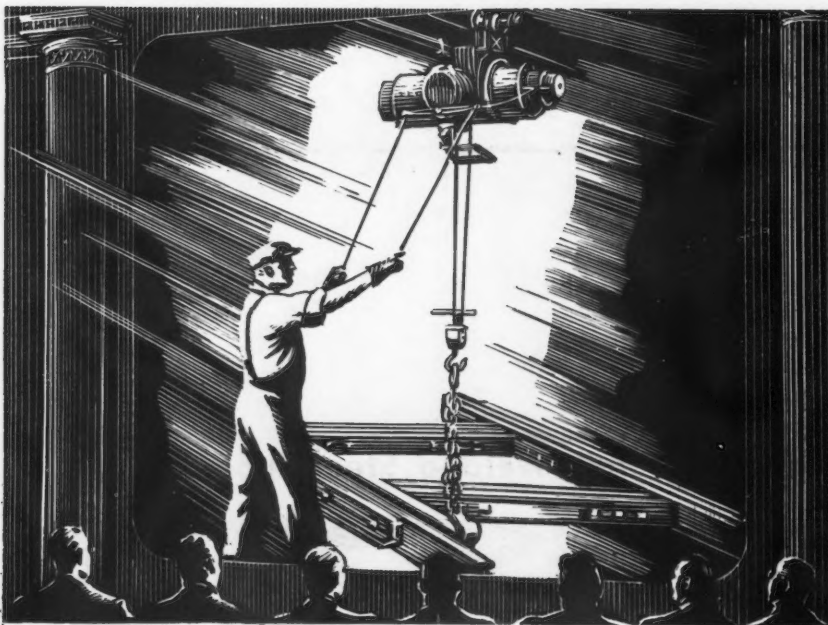
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NEWS OF INDUSTRY

ventories are as low as is suspected. Because of the fact that employment in the rod mills has decreased substantially in the last year, it will no doubt be necessary to employ an additional 500 to 750 workers as soon as the order loads on the mills actually materialize.

In connection with this, requirements for rolled structural shapes are also increasing. Since these shapes are produced on the same equipment used for rod and bar, there will be considerable less open capacity in the rod mills to take care of increases in rod and bar requirements.

Shipments of rivet wire have been approximately 1,000,000 lb. a month less than rivet production during the last quarter, which indicates that rivet producers are probably operating on minimum stocks of wire. This also means that there will soon be a pent-up demand for more rivet wire to meet the increasing aircraft programs. As in the case of rolled structural shapes, any additional production of wire will automatically cut into the production of rod and bar.

Cable orders have been rising each month and the demand for wire for cable will be rising accordingly.

First quarter demand for castings will probably be 10 per cent higher than the fourth quarter 1944, but no serious difficulty is contemplated provided the foundries are able to replace skilled labor, which has been gradually drifting from the industry as a result of the adverse publicity as to the general aluminum situation.

Auto Servicing Need Outlined to Dealers

Pittsburgh

... Stewart W. Munroe, general sales manager of the Chrysler Division, Chrysler Corp., told Pittsburgh dealers this week that almost every automobile now in service will have to be rebuilt and continued on the road, regardless of when manufacture of new cars was resumed.

Speaking before the Pittsburgh district dealers, he said that it is highly improbable that any radical engineering changes will be incorporated in the immediate postwar car, but styling and good taste will be emphasized. Dealers will continue to have all the service business they can handle, and should be providing themselves with facilities to meet this condition.

Published by the Research Staff of
E. F. HOUGHTON & CO.

THE IRON AGE, February 1, 1945—109

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THE "GUSHER"—A MODERN PUMP FOR MODERN MACHINE TOOLS

NEWS OF INDUSTRY

Foreign Nationals Work Out Successfully In War Plant Jobs

Cleveland

• • • Increasing emphasis on the importation of workers for specific jobs in Ohio industry is resulting from the admitted inability of employers and government agencies to fill gaping holes in the production line.

A recent survey revealed that widely divergent categories of manpower have been infused into the labor force with surprisingly little difficulty. As a case in point, 3200 German prisoners of war are working in Ohio war-related industries, such as food processing plants, potteries, in the production of livestock feed, quarrying, and in automobile servicing.

Furthermore, 2500 Mexican nationals, whose efforts have been highly praised by their employers, are engaged in railway track maintenance, rolling stock repair, and freight and baggage handling.

There are also 400 natives of Jamaica, British Crown Colony, employed in heavy industry in the state and about 600 more will arrive to assume similar duties by Feb. 1.

Approximately 600 soldiers have been given 90-day furloughs to bolster lagging production schedules in Ohio plants turning out ammunition and tires. Thirty of these men arrived this week to man a new production line at the King Powder Co., Kings Mills, Ohio.

In addition, 300 soldiers have been placed in the Enlisted Reserve Corps, to take key jobs in Ohio foundries and forging shops that have had critical manpower shortages.

The War Manpower Commission, which has been largely responsible in placing alien labor in places where native or resident labor could not be had, has stated that Jamaicans, for example, are brought in under 90-day readily terminated contracts, so that they could vacate their jobs in this country when native workers, particularly veterans, were available for this work.

P. F. Murphy, regional director of the Railroad Retirement Board, which has directed the recruitment and placement of Mexican workers on the rail lines, said slightly more than 5000 of them had been imported in Ohio. Some returned home on the expiration of their six-month contracts with the railroad, while others came in to replace them.

Despite the separate need for labor

Man with a Million Volts at his Finger-tips

The million-volt X-Ray machine, which rounds out the complete testing and checking facilities in PSF's modern laboratories, can be the means of far greater assurance to you in your casting purchases. It is the final and incontestable proof of soundness and reliability—and, in castings by PSF, it is added to advanced foundry techniques, highly modern machining facilities, and long experience—a combination that can work to advantage for you.



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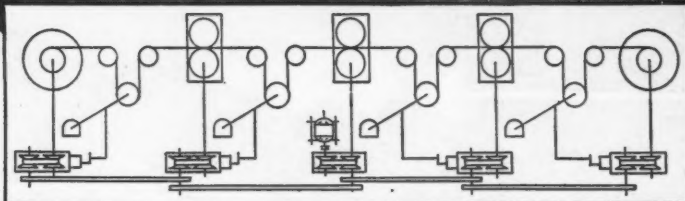
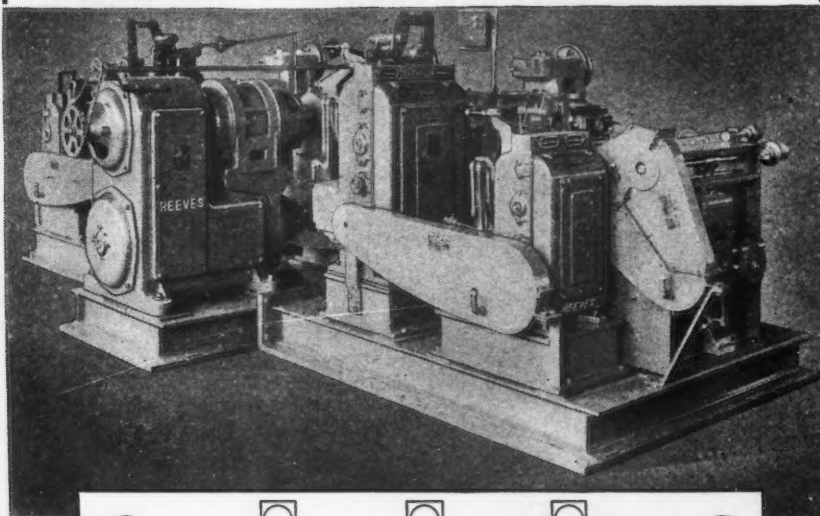
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THE IRON AGE, February 1, 1945—111

Maintain Constant Tension and Velocity

WITH REEVES SPEED CONTROL



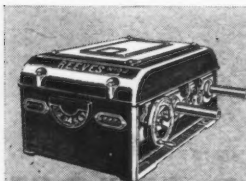
• In production processes where materials are handled on a continuous basis from roll, reel or coil, the need for accurate control of tension and velocity is imperative, and REEVES Variable Speed Control has been found most practical and desirable. The many sizes, designs and speed ratios of the three basic REEVES units simplify these installations to the very minimum of time and expense.

Pictured above is a triple tandem rolling mill built by Waterbury-Farrel Foundry & Machine Co., for flattening wire of many different sizes. Operating speed for best production for each dimension of wire being worked, is selected through a REEVES Motodrive,

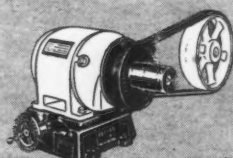
which is the master drive. Two stands are driven by REEVES Transmissions with Hydraulic Automatic Control which synchronize speed of stands with speed of stock. Two more Transmissions with Hydraulic Automatic Control are used, one to set tension in wire from pay-off roll and one to maintain same tension on windup roll. The third stand is driven directly by the master drive.

REEVES speed adjustability, available in manual, electric remote or completely automatic controls, is the answer to a large number of production problems. Tell us what you want to accomplish. Nation-wide staff of speed control engineers to serve you.

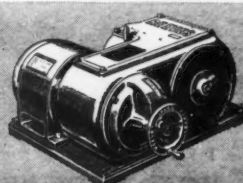
REEVES PULLEY COMPANY • Dept. I • COLUMBUS, INDIANA



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of almost any kind, considerable emotional ferment has been created by the employment of German prisoners for work related to the prosecution of the war. In one cannery when the use of captive Germans was broached by the cannery operator to his personnel several months ago, the women who made up most of his labor force were virtually unanimous in asserting, "We won't work next to a dirty Nazi."

But when the use of the prisoners was started, all the women workers reported for duty and so great was their curiosity about the demeanor of the ex-members of the Wehrmacht in menial jobs, that absenteeism in the cannery declined.

And while all of these things were important, and indicated that all manpower channels apparently available, were being filtered, along with the 4-F's into war employment's endless void, the problem became more acute than ever.

In Canton, at the Timken Roller Bearing Co., there were 2000 jobs waiting to be filled, and according to A. M. Donze, vice-president in charge of production, this shortage was the result of losing 3200 workers in less than a year, some apparently to unessential jobs. To offset the shortage, Timken is opening a "shadow" plant at Elmira, N. Y., and January and February production schedules cannot be met because of labor shortages.

In Dayton, the first rumblings of a step approaching a quasi-labor draft were felt, when the WMC area office stated that it might be necessary to apply a program for the forced release of workers in less essential jobs. In such cases, the general procedure will be that employment ceilings will be lowered so that plants will have to release workers for war work. There are in the Dayton area more than 4900 essential jobs which must be filled: of these 602 must be filled by Monday, Jan. 20 and at this time 253 still are untaken.

By way of contrast, in Youngstown, it was announced by Dr. Joseph E. Smith, area WMC director, that the program of forced release of workers in less essential firms to war plants in labor-short areas will not be necessary in this district. According to Dr. Smith, the January 15 report showed that nearly all top priority jobs were filled.

As this was going on, personnel managers of six Cleveland firms stated that war workers who get mixed up in factory romances are fired.

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RESISTS SLIPPING IN ANY DIRECTION



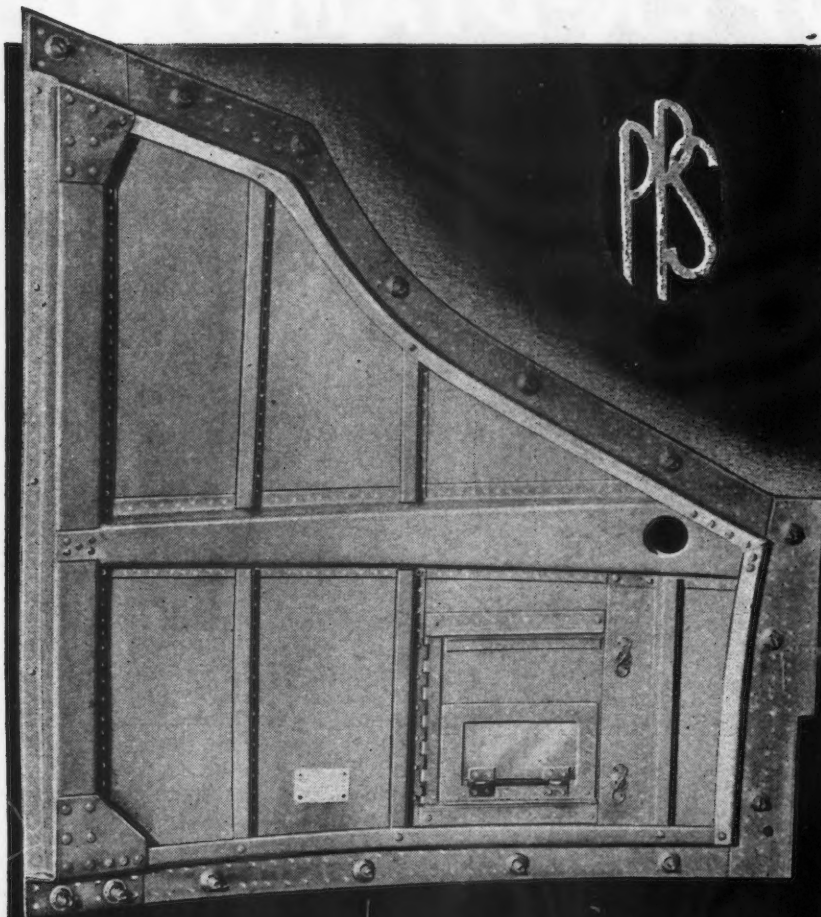
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Plans for Further War Aid to Chinese Called Extensive

Washington

... American aid to the Chinese National government is summarized in a report released by the Office of War Information, gleaned from the war agencies. While giving few figures on the actual quantities of aid offered in particular lines, the types of assistance are listed, and plans for training personnel, shipment of trucks, foodstuffs, and other materiel are discussed.

According to the report, plans are to increase war production within China, increase importation of essential war material from the United States, and help break the bottleneck of inadequate transportation inside China. American operations in the Pacific theater are designed, among other things, to open China for shipments of American goods. Donald M. Nelson's present mission into China is designed to set up new administrative machinery for control of war production and raw materials directly under Generalissimo Chiang Kai-shek.

For information on China's iron and steel production see THE IRON AGE, Dec. 14, p. 102.

Internal transportation within China has become progressively more and more dependent upon the coolie bearers and animal pack trains as her initial supply of motor trucks has dwindled. It is estimated that China has only about 6000 trucks now in operation, a result of hard usage over bad roads and lack of adequate repair parts and facilities. The newest of these is more than three years old. This number is to be doubled as quickly as possible by imports of new trucks from the United States.

In recent months the tonnage flown from India into China over the Hump of the Himalaya mountains has been estimated at better than 20,000 tons a month. A sharp increase was achieved in November to not less than 30,000 tons.

An increase has become possible only recently, not only because of previous limitations upon transport of cargoes over the Hump, but because after tonnage had been flown in, it was extremely difficult to move the supplies out of Kunming and distribute them within China. A month's record was cited in which 10,000 tons were flown in, but only 3000 tons dis-

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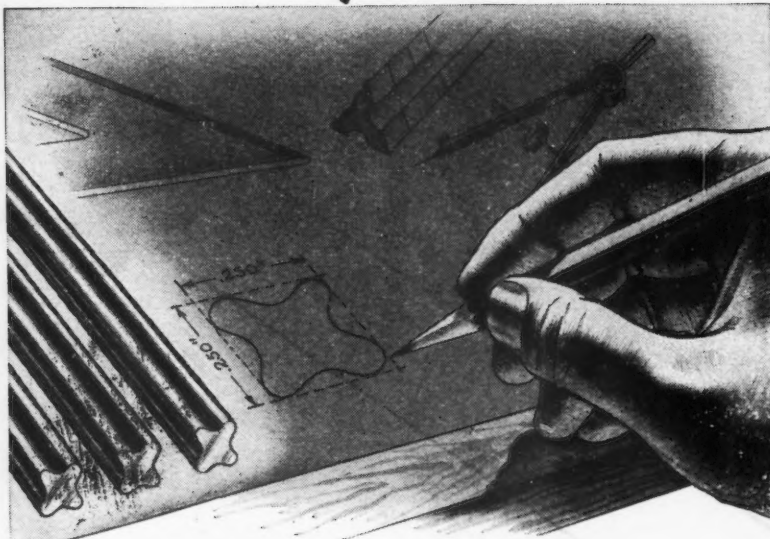
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Yes, and PAGE will go further than that. From years of experience, PAGE has learned much about the economical application of shaped wire to manufacture. PAGE offers you the benefit of this experience in finding ways to cut your production costs through the use of shaped wire.

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NEWS OF INDUSTRY

tributed out of Kunming. However, FEA transportation men, working in concert with the Chinese, have succeeded in improving transportation facilities out of Kunming. The average flow of cargo out of the over-the-Hump terminus had been quadrupled as of September 1, and still is increasing.

Other American aid includes the following:

1. Rapid expansion of air transport service into China. In addition to stepping up U. S. air transport, it is planned to supply the China National Aviation Corporation with modern four-motor planes to replace its present two-motor Douglas transport planes.

2. Material progress in opening and constructing a new land route into China from India. It has been estimated that the Ledo-Burma road, when completed, may funnel as much as 10,000 to 15,000 tons additional each month into China. More than 150 miles of the road remain to be built, and other sections need improvement, since many portions of it will not permit trucks to carry more than half-ton load. Completion of a four-inch pipeline to carry gasoline into China by this route would make it possible to deliver 12,000 tons of gasoline a month, or as much of this total as is not needed for Burma military operations.

3. Establishment and operation of American air forces in China. General Chennault's forces are estimated at a total of 500 planes, the larger percentage of them bombers.

Lend-lease aid to China, in the form of supplies, has been limited by other factors, besides the difficulty of getting material into the country. The logistics of supply include distribution within China, after the material has reached Kunming, and China's internal transportation is extremely difficult. The region in which the Chungking Government now functions was until recently dependent entirely upon river boats, beasts of burden and coolies. Most of the roads were trails, and the terrain is mountainous and cut by deep gorges. Lack of trucks was a sharply limiting factor. In the last year, according to Chungking, 118 miles of railways and 900 miles of roads have been built, mostly lost now, as a result of Japanese action.

Lend-lease shipments for China have totaled \$380,584,000 from May, 1941, to June 30, 1944. The rate of shipment has been considerably in-

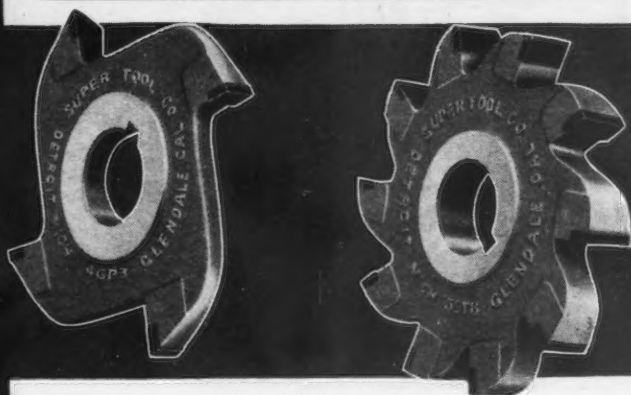
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SPECIFICATIONS AND PRICES Cutters for Cast Iron, Brass, Bronze, Aluminum, Etc.

Tool Order No.	Diameter	Width	Hole	No. of Teeth	Price Each
3-GP-1	3"	1/4"	1"	4	\$ 9.75
3-GP-2	3"	5/16"	1"	4	9.75
3-GP-3	3"	3/8"	1"	4	10.00
3-GP-4	3"	7/16"	1"	4	11.00
3-GP-5	3"	1/2"	1"	4	12.00
4-GP-1	4"	1/4"	1"	4	12.00
4-GP-2	4"	5/16"	1"	4	12.00
4-GP-3	4"	3/8"	1" or 1 1/4"	4	12.25
4-GP-4	4"	7/16"	1"	4	13.00
4-GP-5	4"	1/2"	1" or 1 1/4"	4	13.50
4-GP-6	4"	9/16"	1"	4	15.00
4-GP-7	4"	5/8"	1" or 1 1/4"	4	16.00
4-GP-8	4"	3/4"	1" or 1 1/4"	4	17.00
4-GP-9	4"	7/8"	1" or 1 1/4"	4	25.00
5-GP-4	5"	7/16"	1 1/4"	6	17.25
5-GP-5	5"	1/2"	1" or 1 1/4"	6	17.50
5-GP-6	5"	9/16"	1 1/4"	6	18.00
5-GP-7	5"	5/8"	1 1/4"	6	18.25
5-GP-8	5"	3/4"	1" or 1 1/4"	6	20.50
5-GP-10	5"	1"	1 1/4"	6	27.50
6-GP-5	6"	1/2"	1" or 1 1/4"	6	21.00
6-GP-7	6"	5/8"	1 1/4"	6	22.00
6-GP-8	6"	3/4"	1" or 1 1/4"	6	26.00
6-GP-10	6"	1"	1 1/4"	6	30.00
7-GP-8	7"	3/4"	1 1/4"	8	30.00
7-GP-10	7"	1"	1 1/4"	8	33.00
8-GP-8	8"	3/4"	1 1/4" or 1 1/2"	8	35.00
8-GP-10	8"	1"	1 1/4" or 1 1/2"	8	38.50



SPECIFICATIONS AND PRICES Cutters for Use in Steel

Tool Order No.	Diameter	Width	Hole	No. of Teeth	Price Each
3-ST-1	3"	1/4"	1"	6	\$14.00
3-ST-2	3"	5/16"	1"	6	14.00
3-ST-3	3"	3/8"	1"	6	14.25
3-ST-4	3"	7/16"	1"	6	15.50
3-ST-5	3"	1/2"	1"	6	16.25
4-ST-1	4"	1/4"	1"	8	17.00
4-ST-2	4"	5/16"	1"	8	17.75
4-ST-3	4"	3/8"	1" or 1 1/4"	8	18.25
4-ST-4	4"	7/16"	1"	8	18.75
4-ST-5	4"	1/2"	1" or 1 1/4"	8	19.50
4-ST-6	4"	9/16"	1"	8	20.75
4-ST-7	4"	5/8"	1" or 1 1/4"	8	22.00
4-ST-8	4"	3/4"	1" or 1 1/4"	8	22.00
4-ST-9	4"	7/8"	1" or 1 1/4"	8	30.00
5-ST-5	5"	7/16"	1 1/4"	10	22.50
5-ST-6	5"	1/2"	1" or 1 1/4"	10	23.00
5-ST-8	5"	9/16"	1 1/4"	10	25.50
5-ST-7	5"	5/8"	1 1/4"	10	26.50
5-ST-8	5"	3/4"	1" or 1 1/4"	10	30.00
5-ST-10	5"	1"	1 1/4"	10	35.00
6-ST-5	6"	1/2"	1" or 1 1/4"	12	33.75
6-ST-7	6"	5/8"	1 1/4"	12	35.00
6-ST-8	6"	3/4"	1" or 1 1/4"	12	37.00
6-ST-10	6"	1"	1 1/4"	12	40.00
7-ST-8	7"	3/4"	1 1/4"	12	39.00
7-ST-10	7"	1"	1 1/4"	12	45.00
8-ST-8	8"	3/4"	1 1/4" or 1 1/2"	12	40.00
8-ST-10	8"	1"	1 1/4" or 1 1/2"	12	50.00

Variations from above specifications subject to special quotation.

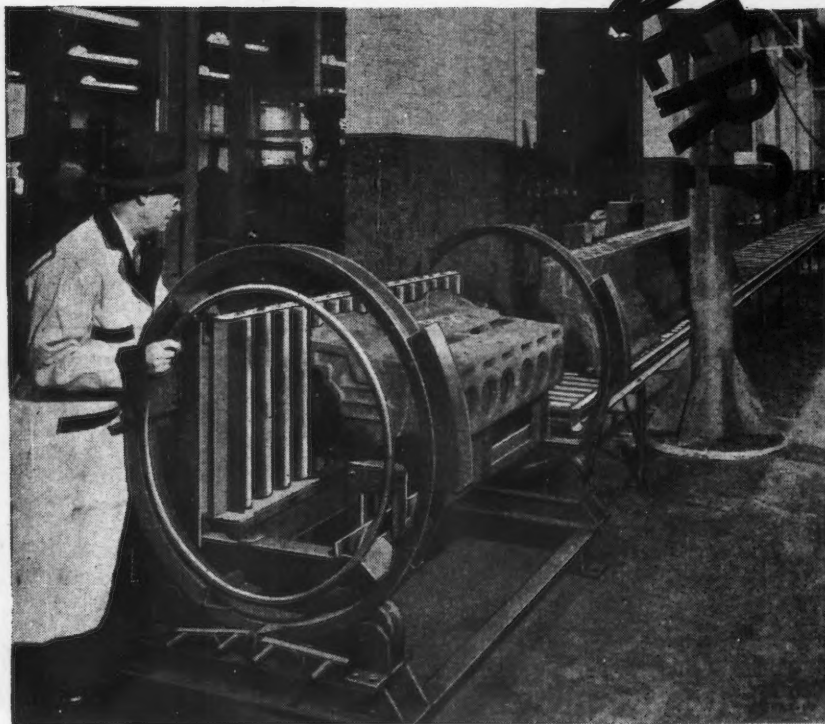
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PUT FLOW INTO PRODUCTION

NEWS OF INDUSTRY

creased in the last year. Help given to China includes:

1. Supplies, machinery and tools for the Chinese arsenals, and wire rope for China's salt wells.

2. Supplies for industries engaged in war work.

3. Railroad supplies in small amounts and American railway experts to advise and assist the Chinese in railway transportation work.

4. Planes supplied to the China National Aviation Corporation. New larger transports now are being supplied as a consequence of Mr. Nelson's mission.

5. Spare parts, tires, repair machinery and tools for trucks. Some of this equipment and parts was flown all the way from the United States. Also automotive maintenance and mechanical personnel.

6. 5000 heavy-duty trucks, a new consignment on which delivery is being rushed.

7. Two Liberty ships to assist in transporting goods to India for China. These ships also serve as training ships for Chinese officers and crews. One of these was sunk by enemy action, but was replaced.

The greater part of China's industrial enterprises were concentrated around a few coastal cities such as Canton, Shanghai, Tientsin and Tsingtao. This was because trade with China and introduction of western business methods naturally focused on the treaty ports where communities, industries, and transportation were built up before the extra-territorial system was abolished. This entire area is now occupied by the Japanese. The same thing is true of the railways, highways, and deep water routes of communication.

What is now known as Free China was, at the outbreak of the war, mainly agricultural with very few factories. There was not in that area a single blast furnace, nor a coal mine that produced annually more than ten thousand tons. Thus the Japanese occupation has cost the Chinese both their factories and their resources, as well as their chief transport media.

China's heavy industrial program was mapped out in 1936 and, with the southeastern provinces as the base, a three-year plan was adopted for the establishment of mining and manufacturing enterprises in Hupeh, Hunan and Kiangsi Provinces. When the war broke out, the establishments were either under construction or in a preparatory stage. The provinces soon felt the menace of war and construction

Help given to

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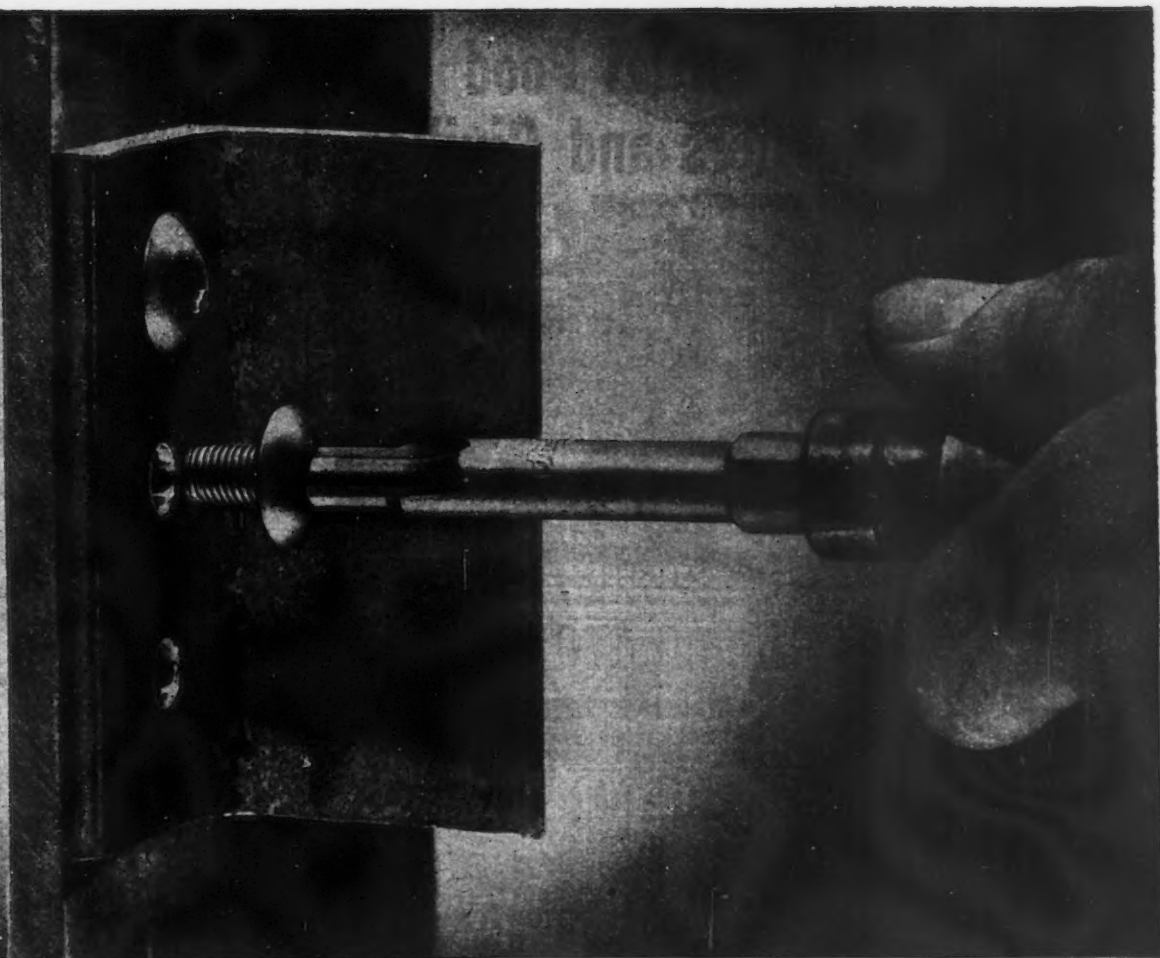
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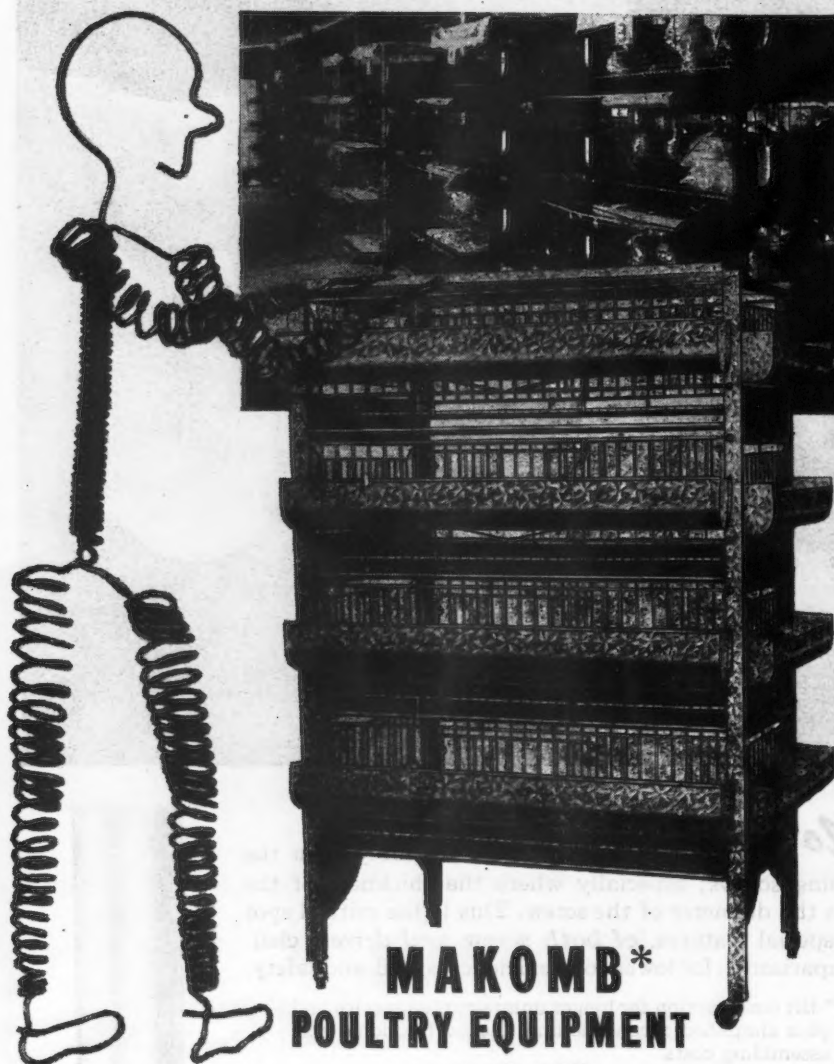


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NEWS OF INDUSTRY

work there had to be either suspended or moved to the interior. The heart of new industries in Free China formed by the 450 factories, whose machinery weighing over 115,000 tons was removed between 1936-1940 from the eastern war zones. By the end of 1940, 50 new industrial bases had been started, including a total of 135 plants, among which are the following:

- 316 Chemical plants
- 312 Mechanical plants
- 282 Textile mills
- 93 Mining and metallurgical
- 47 Electrical plants
- 259 Sundry factories

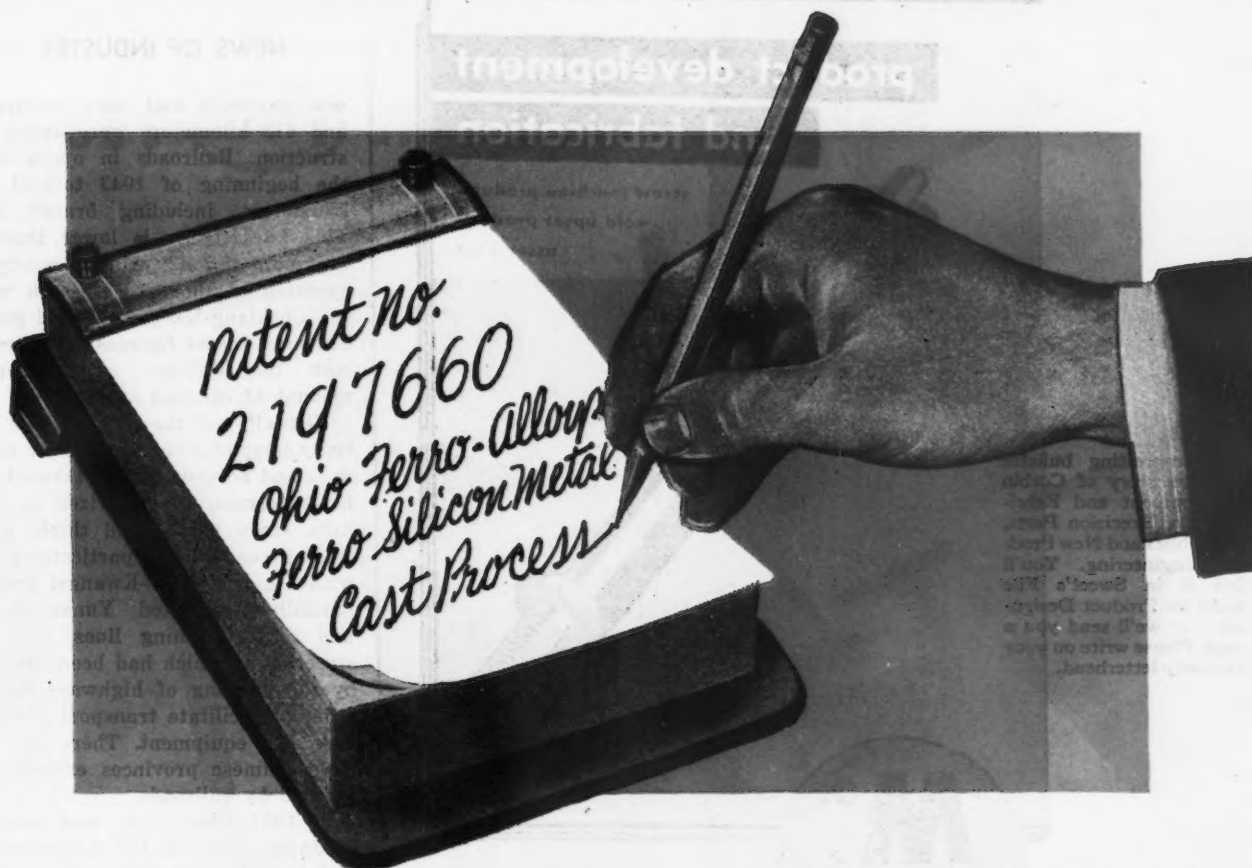
In spite of these difficulties, the development of heavy industry in China had been remarkable, as shown by the following table:

Year	New Factories
1936	16
1937	42
1938	53
1939	54
1940	55
1941	78
1942	98

While in 1937 only 400 tons were extracted from copper deposits in Free China, this figure amounted in 1940 to 1000 tons. Between July, 1943, and March, 1944, 573 tons of refined and crude copper, and 600 tons of electrolytic copper were produced. Tin is found almost entirely in Free China and the total annual production amounted to about 17,200 tons in 1943. About 1000 metric tons of zinc are produced in Free China.

The most important machine-making factory under control of the National Resources Committee is the Central Machine Works, first situated at Hunan and later moved to Kunming. It produces boiler plants, gas engines, turbo-generator sets, gas producers, machine tools, textile machines and parts of vehicles—totaling 120 kinds of machinery. A rather important number of machine shops has been established in Kansu, Kwangtung, Kiangsi and Szechuan.

Within two years after the outbreak of hostilities, 80 per cent of the Chinese railroads were gone. The services the railroads rendered under war conditions, especially in the moving of the industries to the interior, were epic. While up until September, 1942, only little more than 1100 kilometers of all the lines constructed before the war still were operating for Free China, statistics show that up to that time 1207 kilometers of



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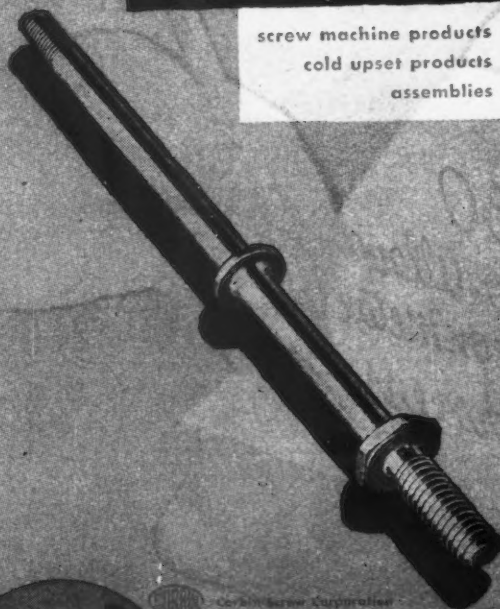
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This interesting bulletin tells the story of Corbin Development and Fabrication of Precision Parts, Assemblies and New Product Engineering. You'll find it in Sweet's File 4m10 for Product Designers — or we'll send you a copy. Please write on your company letterhead.



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... better than ordinary screw machine parts! Because here at Corbin we don't have to *start* or *stop* with the Screw Machines. Corbin M³ facilities include batteries of headers, grinders, thread rollers, millers . . . in addition to hundreds of automatics. Corbin's men, materials and machines mean *full* fabrication, modern scheduling control . . . assuring economy, rapid production, full inspection — and any quantity desired.

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The American Hardware Corporation, Successor

NEW BRITAIN

CONNECTICUT



See Sweet's Product Design
Catalog, outline of Corbin
Products and Facilities

Precision Parts

NEWS OF INDUSTRY

new railroads had been constructed and 613 kilometers were under construction. Railroads in operation at the beginning of 1943 totaled 2723 kilometers, including branch lines. This kilometrage is lower than the first half of 1942, prior to enemy occupation of the area through which the Chekiang-Kangsi railroad passes. The most recent Japanese advance has cost the Chinese a considerable amount of railroad mileage.

Virtually all the projected or partially completed railroads in the south west and northwest pass through difficult terrain, characterized by high hills, steep passes and thinly populated areas. This is particularly true with the Kweichow-Kwangsi and the partially completed Yunnan-Burma and Suifu-Kunming lines, the construction of which had been preceded by the building of highways first in order to facilitate transport of materials and equipment. There are still eight Chinese provinces entirely untouched by railroads.

By 1937, when China was attacked by Japan, over 100,000 kilometers of highways linking all important centers were finished. Up to the summer of 1942 only 76,000 of these remained in Chinese hands. In addition, 6000 kilometers of new highways had been built.

British Tinplate Firms Merge, Plan Modernization New York

... Richard Thomas and Co. Ltd., leading tinplate producers in the British Isles on Jan. 1, took over the tinplate and steel sheet business of Baldwin Ltd. with all fixed assets. The company accounts for about 45 per cent of the total British tinplate capacity under the new arrangement.

It is stated that the plan is for the companies to work in the fullest collaboration on the proposed modernization of the tinplate and sheet industries of South Wales in conjunction with other companies interested in these trades, and will assist such developments to the fullest possible extent financially.

The statement is interpreted in this country as foreshadowing a large scale modernization and rationalization drive resulting in the closing down of obsolete plants, and the concentration of operations in the largest and most economical mills. This policy will be necessary if Britain is to regain her former position of importance in the international tinplate trade.

WOOD'S **Moly** SHOVELS receive their



Ruggedness
from the Rockies.



...where magic **MO-LYB-DEN-UM** is mined

WOOD'S Moly Shovels, Spades and Scoops have really magical qualities of toughness, hardness, and wear-resistance. These exceptional qualities are derived from the special Mo-lyb-den-um alloy steel, (made to Wood's own special analysis) used in the blades of these truly super tools.

WOOD'S development of Mo-lyb-den-um alloy steel for shovels has been so outstanding as to earn the exclusive right for world-wide use of the name Moly.

Buy these better tools for toughest jobs where ordinary shovels don't stand up. Moly Shovels are unconditionally guaranteed to out-wear, out-last any shovels made.

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A National Organization Specializing
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Moly

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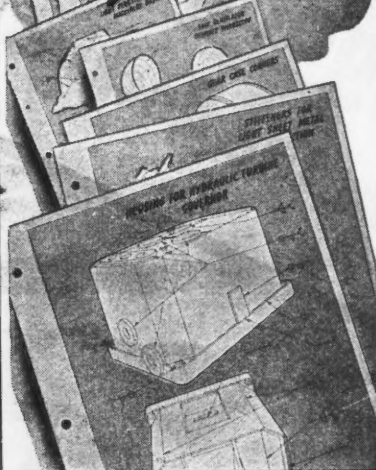
MO-LYB-DEN-UM

ALLOY

SHOVELS

Illustrated: Moly
Closed-Back Scoop—
with Steel-Beam Han-
dle Reinforcement.

Here are your
"KEYS" to
many a Post-War
Design Problem...



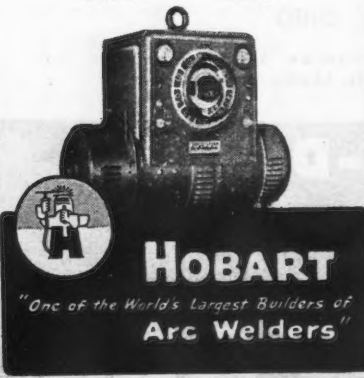
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Arc Welding has made possible most of the phenomenal records established in war production. That's why Hobart offers these design and redesign sheets to help you with your post-war metal joining problems. Change to welded design for a better, more competitive product at lower costs.

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NEWS OF INDUSTRY

Sales of Strategic Items by RFC Costs Over \$142 Millions

Washington

• • • Exclusive of losses which may be sustained on the sale of inventories, RFC has reported that as of last Dec. 31, its subsidiaries had paid out \$142,845,391 in excess of the sales value of strategic or critical material.

Among materials on which substantial losses were sustained on purchase and resale are the following: Aluminum rivets, barbed wire, alumina, aluminum (primary), antimony ore, chrome ore, copper, copper ore, magnesium, nickel, pig iron, tin, tungsten ore, vanadium, vanadium ore, aluminum scrap, brass scrap, copper scrap, nickel scrap, steel scrap, tin cast metal, white metal, brass and bronze valves and oil country pipe.

Direct subsidies paid to increase or maintain production of strategic or critical materials amounted to \$1,410,328,121. These subsidies have been paid in connection with a long list of commodities, such as aluminum rods and bars, refractory bricks, copper, lead, zinc, ferrochrome and tin scrap.

Foundrymen Publish Books On Sands and Clay Research

Chicago

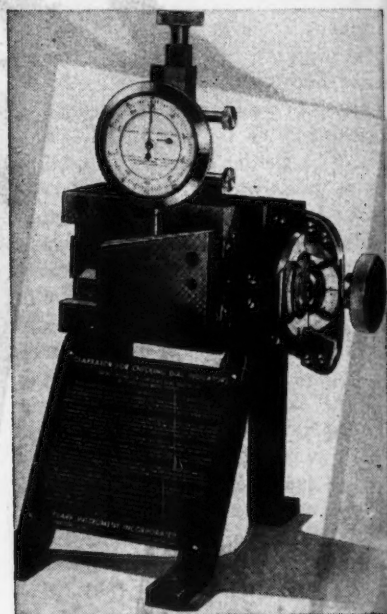
• • • Publication of the fifth edition of the AFA sand testing handbook, outlining standard and tentative standard methods for testing and grading foundry sands and clays, has been announced by the American Foundrymen's Association.

The book was prepared by the committee on foundry sand research and published under the technical development program of the association. The new edition includes revisions from previously published data, which has formed the basis for many sand control developments since 1924, when the first edition was published.

General distribution to non-members is at a list price of \$3.50. The handbook is published at 222 West Adams Street, Chicago 6.

Also published, for distribution to members, are two booklets comprising collections of papers, and discussions on gating and heading of malleable castings and on practical and theoretical aspects of the centrifugal casting process. The material originally was presented at AFA annual meetings and is reprinted from the association's quarterly "Transactions."

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SPECIALISTS IN TUBE FABRICATING EQUIPMENT

MACHINE TOOLS

... News and Market Activities

Ammunition Programs Result in Big Screw Machine Item Demand

Washington

••• Enlarged major ammunition programs have increased by 80 per cent requirements for screw machine products over the demand existing in January of last year, WPB officials reported at a recent meeting of the Screw Machine Products Industry Advisory Committee. To bring production up to full capacity of existing facilities, a minimum of 5000 set-up men is needed, according to estimates of committee members and if they can be obtained an additional 50,000 workers can be used. The most urg-

ently needed items for which screw machine products must be provided are for artillery fuses and boosters.

The chief factor now limiting production of screw machine products was said to be lack of skilled manpower. It was pointed out that from three to four years' training is required for skilled workers and that unless they are available for key positions, workers with less skill cannot be utilized, even if available. Committee members said that the industry is producing at only 60 per cent of capacity, due to loss of skilled workers.

Government officials said that additional facilities must also be brought into production and industry members must assist in locating idle facilities

since a canvas of the industry is difficult because it consists of some 3000 firms, producing on both a jobbing and integrated plant basis.

WPB Tools Division Tightens Controls

Washington

••• For the purpose of increasing the flow of the critical equipment to war requirements, the WPB Tools Division has announced an amendment to General Preference Order E-1-b, which tightens the distribution of machine tools on unrated orders and requires machine tool builders to meet delivery dates on rated orders before scheduling any unrated orders. Delivery schedules already established for February and March are not affected by the latest amendment, it was pointed out, but diversions to insure delivery of war requirements will continue to be made wherever necessary.

This is the second amendment to Order E-1-b issued this month. On Jan. 2 WPB required that tool purchase orders of the armed services and their prime contractors and subcontractors must be accompanied by photostatic copies of WPB-542 certificates to permit identification with urgent programs.

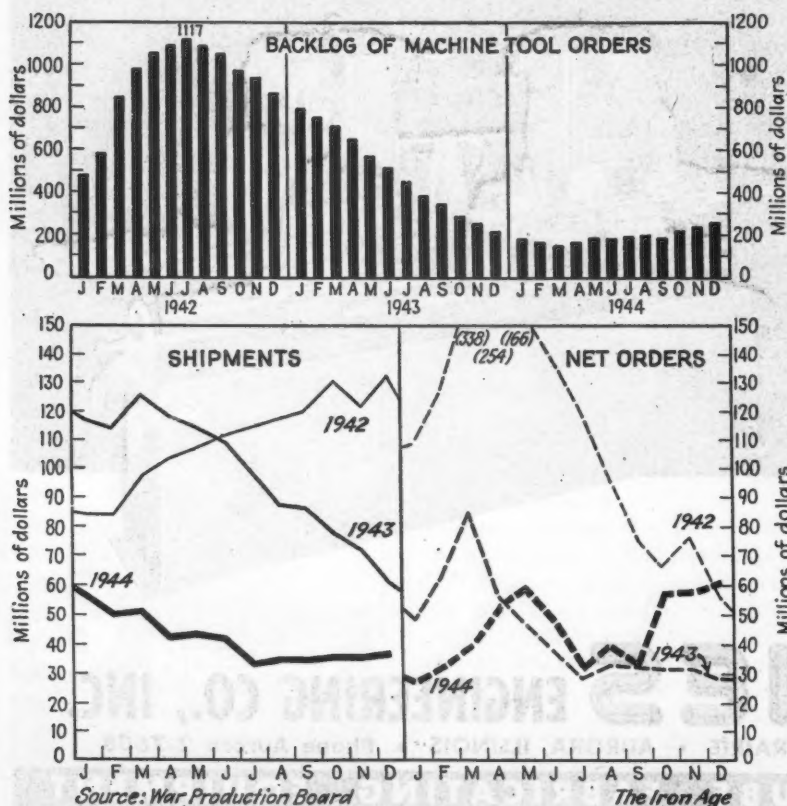
Builders Welcome British Deal on Lend-Leased Machines

Cincinnati

••• Reaction of district tool builders to announcement of British purchase of lend-lease machines was generally favorable. That this will probably avoid, or at least relieve, the possibility of dumping many tools on the postwar market. The general war business continues in good volume with backlogs touching seven months. Some manufacturers have refused orders because of inability to make deliveries under six months. Current interest in tools covers the whole list, with none particularly prominent. Manpower continues as an outstanding problem with officials indicating an upsurge of applications at U.S.E.S. Few skilled men, however, appear in the lists, but management is taking whatever is available for keeping productions.

• Maintenance of machine tool shipments at the current rates of delivery will require approximately seven months to fill orders on hand at the end of 1944, according to WPB whose Tools Division reported that December shipments by 199 firms increased 1.4 per cent to \$36,782,000 over November valuations of \$36,277,000. Total orders during December amounted to \$65,099,000. Net new orders totalling \$61,027,000 (total orders less cancellations) increased 5.8 per cent during December or \$3,399,000 over November.

The backlog of unfilled orders showed an increase to \$260,501,000, gaining 10.7 per cent over November's unfilled orders. Export or unrated orders represented less than half of this backlog, Tools Division officials said.



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Precision and quality always have been primary considerations at Cadillac Gage Company. For Cadillac engineers realize that upon the precision of their workmanship and the quality of the gages they manufacture depend the quality of the work produced by Cadillac Gage customers.

Unsurpassed quality, painstaking workmanship and the highest standards of precision, however, are not the only reasons why production men in ever increasing numbers specify Cadillac for their thread gaging equipment. Cadillac's immense stock of over 10,000 gages in all standard sizes provides gages for immediate delivery—a time-saving and money-saving feature.

Next time you order thread plug or thread ring gages, specify Cadillac . . . and let Cadillac standards protect your high standards of manufacturing.



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Have you a job that is really tough on gages? Try Cadillac STELLITE Thread Plug Gages! See for yourself that these gages will give 5 to 20 times the wear of regular steel gages.

NON-FERROUS METALS

... News and Market Activities

Lead Restriction May Build Stockpile

New York

• • • The recently issued revision to the lead conservation order, M-38, is acknowledged by the industry to be so severe that freer lead supplies are to be anticipated in the near future as a result of restricted consumption. In that connection the WPB is said to be considering a revision of this order to permit certain relaxations that seem advisable. Among others, the use of white lead for paint manufacture has been drastically curtailed by order M-384 covering lead chemicals which accompanied the issuance of the lead order.

It is believed that the lead stockpile now approximates 80,000 tons, which would be ample to tide over any possibility of a strike of Mexican mine workers. It should be noted that months ago, when a stockpile of 150,000 tons of lead was reported, some concern was expressed for the adequacy of supplies. At that time, however, lead consumption was virtually unrestricted and this is an important factor in the picture.

Mercury

• • • Throughout history the market fluctuations of this metal have been drastic and unpredictable. The past year has proved no exception.

Nearly reaching the ceilings of \$191 per 76 lb. flask, Pacific Coast, \$195 to \$197 New York, mercury has been sold this week as high as \$170 New York. This represents a rise from the low of \$95 last July. A year ago the Metals Reserve Co. terminated its program for buying domestic mercury at a floor price of \$192 per flask at New York. Ever since, anticipation of the price has been the purest speculation.

It is estimated that there are only 25 mines in production now compared to 195 a little more than a year ago. The present domestic production of mercury averages 2300 flasks a month to fulfill a demand approaching 3900 flasks. Rather large quantities of mercury are said to be going into the production of dry cell batteries in the form of oxide for military use, a development which per-

mits much more compact and efficient storage of electrical energy than the conventional type of construction.

One or two closed mines are reported to have begun production recently and others will be opened as the price of mercury approaches ceiling. The cost of reopening a mine is costly and miners hesitate to make this investment without assurance of a reasonable period of good prices. Moreover, the supply of labor has been dissipated and the rainy season in producing areas makes it difficult to reopen mining properties.

Storage Battery Needs Stress Head Supplies Below Requirements

Detroit

• • • Present and forthcoming supply of lead is figured about 15 per cent below 1945 requirements, and as a result some quarters anticipate a shortage in civilian automobile batteries.

Military requirements of approximately 4,000,000 storage batteries of all types are approximately a million greater than in 1944. Although Air Force demands have declined, those of the Navy have increased most considerably, and Ordnance needs for tanks and trucks are so large that some difficulty is being experienced in placing all orders.

To fill military requirements, civilian battery outlet will be considerably reduced. The Office of Defense Transportation estimates that 19,000,000 units are needed this year, and from the present look of things it will be impossible to produce this total.

The root of the lead shortage is believed to derive from the fact that in the early stages of the war when lead was plentiful, deferments were few and far between for lead miners. The problem is one of manpower. However, current requirements are so large that even if sufficient lead was available new facilities would be needed for battery output in the quantity required, and accordingly additional facilities are being planned

Aluminum Scrap

• • • Prices of aluminum scrap have remained firm this week. There seems to be no price reaction to the announcement of the Surplus Property Board about release of the government inventory of aluminum scrap for use in meeting the current war production program.

It is believed in the trade that this condition of price stabilization may not continue a great deal longer. Prices are said to be firm now while working inventories of aluminum ingot are being built up. This trend is expected to slacken off some time in the near future.

and constructed. One such will be in the Rock Island plant of the National Battery Co.

Antimony Restriction Under Consideration

New York

• • • It is reported that WPB is considering the issuance of an order further restricting the use of antimony so that expanded military needs can be accommodated by available supplies. This alloying agent, formerly under complete allocation control, has recently been more freely available. Currently the metal has been in short supply, due to some extent to increased consumption of the oxide for fireproofing of canvas.

WPB Acts to Conserve Tin

Washington

• • • All outstanding authorizations for the use of tin that existed prior to Sept. 1, 1944 have been canceled by the WPB in a new step to conserve a diminishing stockpile. Last December, WPB stopped the sale of jewelry containing tin, effective March 1 this year. Cancellation of outstanding authorizations was effected through Direction 1 to Order M-43, issued Jan. 27.

Officials of WPB's Tin-Lead-Zinc Division said this action was necessary to eliminate authorizations for tin uses that are now prohibited and to cancel outstanding authorizations without fixed termination dates.

NON-FERROUS METALS PRICES

Primary Metals

(Cents per lb., unless otherwise noted)

Aluminum, 99+%, del'd. (Mia. 10,000 lb.)	15.00
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be; dollars per lb. contained Be	\$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb.)	\$1.50 to \$1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	\$35.00
Indium, 99.5%, dollars per troy oz.	\$4.50
Iridium, dollars per troy oz.	\$120.00
Lead, St. Louis	6.25
Lead, New York	6.50
Magnesium, 99.9+%, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb. flask, f.o.b. New York	\$170.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	\$24.00
Platinum, dollars per oz.	\$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	3.25
Zinc, New York	3.45

Remelted Metals

(Cents per lb., unless otherwise noted)

Aluminum, No. 1 Fdy. (No. 2) 9.00 to 10.00	
Aluminum, deoxidizing	
No. 2, 3, 4	6.00 to 9.50
Brass Ingot	
85-5-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
89-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mia. base, cents per lb.)

Extruded		
Shapes	Reds	Sheets
Copper	20.37	20.37
Copper, H.R.	17.37	
Copper drawn	12.37	
Low brass, 80%	20.40	20.15
High brass		19.48
Red brass, 85%	20.61	20.36
Naval brass	20.37	19.12
Brass, free cut	15.01	
Commercial bronze, 90%	21.32	21.07
Commercial bronze, 95%	21.53	21.28
Manganese bronze	24.00	23.00
Phos. bronze, A, B, 5%	36.50	36.25
Muntz metal	20.12	18.87
Everdur, Herculey, Olympic or equal	25.50	26.00
Nickel silver, 5%	28.75	26.50
Architect bronze	19.12	

Aluminum

(Cents per lb., subject to extras on gage, size, temper, finish, factor number, etc.)

Tubing: 1 in. O.D. x 0.065 in. wall 2S, 40c. (1/4 H); 52S, 61c. (O); 24S, 67 1/2c. (T).	
Plate: 0.250 in. and heavier: 2S and 3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S, 24.2c.	
Flat Sheet: 0.188 in. thickness: 2S and 3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.; 24S, 26.7c.	

2000-lb. base for tubing; 30,000-lb. base for plate, flat stock.

Extruded Shapes: "As extruded" temper; 2000-lb. base, 2S and 3S, factor No. 1 to 4, 25.5c.; 14S, factor No. 1 to 4, 35c.; 17S, factor No. 1 to 4, 31c.; 24S, factor No. 1 to 4, 34c.; 52S, factor No. 1 to 4, 28c.; 61S, factor No. 1 to 4, 28 1/2c.

The factor is determined by dividing perimeter of shape by weight per lineal foot.

Wire Rod and Bar: Base price; 17ST and 11ST-3, screw machine stock. Rounds: 1/4 in., 28 1/2c. per lb.; 1/2 in., 26c.; 3/4 in., 24 1/2c.; 1 in., 23c. Hexagonals: 1/4 in., 34 1/2c. per lb.; 1/2 in., 28 1/2c.; 3/4 in., 25 1/2c.; 1 in., 23 1/2c. 2S, as fabricated, random or standard lengths, 1/4 in., 24c. per lb.; 1/2 in., 25c.; 3/4 in., 24c.; 1 in., 23c.

23c. 24ST, rectangles and squares, random or standard lengths. 0.093-0.127 in. thick by 1.001-2.000 in. wide, 23c. per lb.; 0.751-1.500 in. thick by 2.001-4.000 in. wide, 29c.; 1.501-2.000 in. thick by 4.001-6.000 in. wide, 27 1/2c.

NON-FERROUS SCRAP METAL QUOTATIONS

†(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality, quantity and special preparation premiums—other prices are current quotations)

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	3.75
Copper tuyeres	3.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	3.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gliding metal turnings	8.50
Contaminated glided metal solids	8.50
Unlined standard red car boxes	8.25
Lined standard red car boxes	7.75
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
Automobile radiators	7.00
Zincy bronze borings	8.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	3.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.25*
Manganese bronze solids	6.25*
Manganese bronze borings	6.50*
Manganese bronze borings	5.50*

OPA Group 4†

Refinery brass	4.75*
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*Price varies with analysis. †Lead content 0.00 to 0.40 per cent. ‡Lead content 0.41 to 1.00 per cent.

Magnesium

Sheet, rod, tubes, bars, extruded shapes subject to individual quotations. Metal turnings: 100 lb. or more, 46c. a lb.; 25 to 90 lb., 56c.; less than 25 lb., 66c.

Other Copper Alloys

Briquetted Cartridge Brass Turnings	8.625
Cartridge Brass Turnings, Loose	7.875
Loose Yellow Brass Trimmings	7.875

Aluminum

Plant scrap, segregated

2S solids	8.00
Dural alloys, solids 14, 17, 18, 24S	
25S	5.00
turnings, dry basis	3.25
Low copper alloys 51, 52, 61, 63S	
solids	7.00
turnings, dry basis	5.50

Plant scrap, mixed

Solids	4.00
Turnings, dry basis	3.00

Obsolete scrap

Pure cable	8.00
Old sheet and utensils	6.00
Old castings and forgings	5.00
Pistons, free of struts	5.00
Pistons, with struts	3.00
Old alloy sheet	5.00

Magnesium*

Segregated plant scrap

Pure solids and all other solids, exempt	
Borings and turnings	1.50

Mixed, contaminated plant scrap

Grade 1 solids	3.00
Grade 1 borings and turnings	2.00
Grade 2 solids	2.00
Grade 2 borings and turnings	1.00

*Nominal.

Zinc

New zinc clippings, trimmings	6.50
Engravers, lithographers plates	6.50
Old zinc scrap	4.75
Unsweated zinc dross	5.00
Die cast slab	4.50
New die cast scrap	4.50
Radiator grilles, old and new	3.50
Old die cast scrap	3.00

Lead

Deduct 0.55c. a lb. from refined metal basing point prices or soft and hard lead including cable, for f.o.b. point of shipment price.

Nickel

Ni content 98+%, Cu under 1/4%, 26c. per lb.; 90 to 98% Ni, 26c. per lb. contained Ni.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point)

Copper: Cast, elliptical, 15 in. and longer	25 1/2
Electrolytic, full size	22 1/2
cut to size	30 1/2
Rolled, oval, straight, 15 in. and longer	23 1/2
Curved	24 1/2
Brass Cast, 82-20, elliptical, 15 in. and longer	23 1/2
Zinc: Cast, 99.99, 16 in. and over	16 1/2
Nickel: 99% plus, cast	47
Rolled, depolarized	48
Silver: Rolled, 999 fine per Troy (1-9) oz., per oz.	53

Chemicals

(Cents per lb., delivery from New York)

Copper cyanide, tech., 100-lb. bbls. 1-5	5.65
Copper sulphate, 29.5 crystals, bbls.	13.00-13.50
Nickel salts, single, 425-lb. bbls.	34.00
Silver cyanide, 100 oz. lots	40.82-41.125
Sodium cyanide, 96% dom., 100-lb. dms.	0.15
Zinc, cyanide, 100-lb. dms.	33.00
Zinc, sulphate, 39% crystals, bbls.	6.80

SCRAP

... News and Market Activities

Turnings Grades Drop at Detroit

New York

• • • The first break in the ceiling price structure for scrap is apparent this week in Detroit and Chicago where turnings grades have dropped \$1 during the week. This may be a result of news leaking out about the zoning plan for limiting shipments of scrap in order to relieve to some extent the tightness in supplies of railroad cars. It is reported that this plan contemplates delivery, sale, and use of scrap within the limitations of the zone area. This would serve to relieve the present situation in which crosshauling of scrap has been necessary to keep mills in short supply operating. Under OPA regulations in effect prior to the recent weak scrap market, there was a limitation on transportation charges to no more than \$1 per ton.

If the zoning plan is established, scrap producing areas, such as Detroit, would be unable to move all the scrap being produced in the area, and prices would naturally tend to break to abnormally low levels compared to the rest of the country.

PITTSBURGH—It continues to snow here! The weather, being the key to the whole shortage picture here, continues to play havoc with transportation, and the rail embargo tied up all scrap in transit. To avoid the embargo, National Tube shipped some scrap by barge to McKeesport, but steel production is falling in the district because of a combination of adverse factors, the least of which is not the shortage of scrap. All prices continue at ceiling.

CHICAGO—The bottom literally fell out of the turnings market here last week, and at press time no mill offers were outstanding to indicate exactly the extent of the drop. Although the last mill purchase of machine shop turnings was at \$11.50, broker purchases and prices of related grades clearly indicated the improbability of sales above \$11.00. Substantial dealer-broker transactions took place in short shoveling turnings, cast iron borings, and mixed borings and turnings at \$11.75 and later at \$11.00. Heavy indicated production of these grades as a result of the increased shell program and lack of mill interest were factors indicating continued weakness although some recovery may take place.

DETROIT—Turnings grades weakened this week here as several buyers went out of the market. Transactions were much reduced while brokers and dealers took to the sidelines to see what would happen. Evidently the beginning of some

mill belief that the European war might be reaching again toward an end-point led to this situation, but it has not reflected itself yet in heavier grades. Maintenance of open hearth steel prices at ceiling was aided here in part by the return of one large local purchaser to the market after a lengthy absence.

CLEVELAND—Weather conditions here, as in other steel producing centers, seems to be the crux of the whole scrap shortage, transportation tie-up, and general mill troubles. Movement of scrap, of course, stopped during the embargo.

MacBeth Joins Solomon

Pittsburgh

• • • The Max Solomon Co., Pittsburgh, announced this week that James MacBeth, Jr., became affiliated with the company, effective Feb. 1. Mr. MacBeth for the past 30 years has been with the Jones & Laughlin Steel Corp. in various sales capacities, and for the past four years has been manager in charge of sales of pig iron, scrap, coke, and sulphate of ammonia. Max Solomon Co. has been in the scrap yard and brokerage business for the past 67 years.

and mills here were quick to take producing units out of production. Some mills are using this time to make some badly needed repairs. Turnings took on a weakness here characteristic of that which occurred in Chicago last week and, while the price did not break, there is a chance that it will within the next week or so. Some observers lay this weakness at the door of the brokers who are anticipating a knock-out of Germany.

CINCINNATI—Rail embargoes from the south tend to restrict scrap activity and dealers indicate that the market is slower and there are some indications of weakness. Some dealers indicate that for the first time in several weeks they have had the opportunity to get a fair amount of material. Quantity purchases are definitely off, with brokers trying to analyze purchasers' attitudes since the present inventory would not be the whole reason. Some feeling is that victory jitters may be prevalent.

BOSTON—Freight car shortages and embargoes, plus sub-zero weather and snow clogged scrap yards have cut rail shipments to eastern Pennsylvania and the Pittsburgh area to a minimum. Brokers with good trucking connections are

getting some cast to nearby distressed foundries and one reports shipments of No. 1 machinery (broken up lathes), all at ceiling prices.

ST. LOUIS—Continued snow and falling temperatures, plus the shortage of manpower tended further to cut down the movement of scrap iron to this market. Mills continue to cut into their stock piles and are expressing concern over the possibilities for the next 30 to 45 days. Railroad and industrial scrap is now being allocated. Railroad malleable is the latest item to return to the ceiling price.

PHILADELPHIA—With mills in this district having scrap stockpiles of only 10 to 14 days' supply, the freight embargo this past week has hampered mill operations. It is doubtful whether when transportation conditions do clear, mills will be able to build up their inventories. The scrap situation is quite serious while cast grades are impossible to obtain.

BIRMINGHAM—With most kinds of material bringing ceiling prices, demand remains strong in this district for open hearth, blast furnace and cast iron grades. Still below normal is demand for electric furnace and foundry grades. The recent freight embargo delayed the loading of scrap here for Northern mills.

NEW YORK—Cold weather in this district continues and with it the inability to conduct scrap movement to approach normal proportions. The WMC has sent letters to men employed in some yards in this vicinity urging them to transfer to war production industries. This is naturally resented by scrap dealers who consider their listing as only an essential industry to be unfortunate. While the embargo on railway transportation has affected some dealers in this district it has not affected all dealers.

BUFFALO—The scrap movement hit a new wartime low this week under the temporary railroad embargo, which capped a protracted period of dislocation due to severe weather.

Purdy Announces Appointments

Chicago

• • • Appointment of C. A. Steffen and Joseph R. Harrison to serve as general superintendent of all operations, and manager of the scrap department, respectively, of the Purdy Co. was announced last week.

Steffen, former superintendent of dismantling operations, and Harrison, former department manager of Hyman-Michaels Co., join Sparrow E. Purdy, former Hyman-Michaels president and other officials in the new organization.

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages (for ceiling prices see O. P. A. schedule No. 4). Where ceiling prices are quoted they do not include brokerage fee or adjusted transportation charges. Asterisks indicate grades selling at ceilings.

PITTSBURGH

Per gross ton delivered to consumer:

No. 1 hvy. melting.	\$20.00*
RR. hvy. melting.	21.00*
No. 2 hvy. melting.	20.00*
RR. scrap rails.	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bld. new sh'ts.	20.00*
Hvy. axle turn.	19.00*
Hvy. steel forge turn.	19.00*
Mach. shop turn.	15.00*
Short shov. turn.	17.00*
Mixed bor. and turn.	15.00*
Cast iron borings.	16.00*
Hvy. break. cast.	16.50*
No. 1 cupola.	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs.	24.50*
Rail leaf springs.	24.50*
Roller steel wheels.	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:

No. 1 hvy. melting.	\$18.75*
No. 2 hvy. melting.	18.75*
No. 1 bundles.	18.75*
No. 2 dealers' bndls.	18.25 to 18.75
Galv. bundles.	16.25 to 16.75
Mach. shop turn.	10.75 to 11.25
Short shovel. turn.	11.50 to 12.00
Cast iron borings.	11.50 to 12.00
Mix. borings & turn.	11.50 to 12.00
Low phos. hvy. forge	23.75*
Low phos. plates.	21.25*
No. 1 RR hvy. melt.	19.75*
Reroll rails.	22.25*
Miscellaneous rails.	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	24.25*
Cut bolsters & side frames	22.25*
Angles & splice bars	22.25*
Std. car axles	25.75*
No. 3 steel wheels.	22.75 to 23.25
Couplers & knuckles	23.25*
Agricul. malleable.	22.00*
RR. malleable.	22.00*
No. 1 mach. cast.	20.00*
No. 1 agricul. cast.	20.00*
Hvy. breakable cast	16.50*
RR. grate bars.	15.25*
Cast iron brake sh's	15.25*
Stove plate.	19.00*
Clean auto cast.	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:

No. 1 hvy. melting.	\$18.00 to \$18.50
No. 2 hvy. melting.	18.00 to 18.50
No. 1 bundles.	18.00 to 18.50
No. 2 bundles.	18.00 to 18.50
Mach. shop turn.	8.50 to 9.00
Shovelling turn.	10.50 to 11.00
Cast iron borings.	10.50 to 11.00
Mixed bor. & turn.	9.50 to 10.00
Low phos. plate.	20.50 to 21.50
No. 1 cupola cast.	20.00*
Hvy. breakable cast	16.50*
Stove plate.	16.00 to 16.50
Scrap rails.	20.00 to 21.00

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars

No. 1 hvy. melting.	\$15.05*
No. 2 hvy. melting.	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovellings	12.95*
Machine shop turn.	10.05*
Mixed bor. & turn.	10.05*
Cl'n cast, chem. bor.	\$13.06 to 14.15*
Machinery cast	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	20.00 to 23.51*

Cast ceilings are shown for truck delivery.

DETROIT

Per gross ton, brokers' buying prices:

No. 1 hvy. melting.	\$17.32*
No. 2 hvy. melting.	17.32*
No. 1 bundles.	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	\$10.00 to 10.50
Short shov. turn.	12.00 to 12.50
Cast iron borings.	11.00 to 11.50
Mixed bor. & turn.	10.00 to 10.50
Low phos. plate.	18.50 to 19.82
No. 1 cupola cast.	20.00*
Charging box cast.	15.50 to 16.50
Hvy. breakable cast	15.00 to 16.00
Stove plate	18.50 to 19.00
Automotive cast	20.00*

PHILADELPHIA

Per gross ton delivered to consumer:

No. 1 hvy. melting.	\$18.75*
No. 2 hvy. melting.	18.75*
No. 2 bundles.	18.75*
Mach. shop turn.	13.75*
Shovelling turn.	15.75*
Cast iron borings.	14.75*
Mixed bor. & turn.	13.75*
No. 1 cupola cast.	20.00*
Hvy. breakable cast	16.50*
Cast, charging box.	19.00*
Hvy. axle, forge turn	18.25*
Low phos. plate.	21.25*
Low phos. punchings	21.25*
Billet crops	21.25*
RR. steel wheels.	23.25*
RR. coil springs.	23.25*
RR. malleable	22.00*

ST. LOUIS

Per gross ton delivered to consumer:

Heavy melting	\$17.50*
Bundled sheets	17.50*
Mach. shop turn.	\$10.00 to 10.50
Hvy. axle turn.	16.75
No. 1 loco. tires.	20.00
Misc. std. sec. rails.	19.30*
Rerolling rails	21.00*
Steel angle bars	21.00*
Rails 3 ft. and under	21.50*
RR. springs	22.00*
Steel car axles	21.50 to 22.00
Stove plate	17.00
Grate bars	15.25*
Brake shoes	15.25*
RR. malleable	22.00*
Cast iron carwheels	18.50*
No. 1 machinery cast	20.00*
Breakable cast	16.50*

BIRMINGHAM

Per gross ton delivered to consumer:

No. 1 hvy. melting.	\$17.00*
No. 2 hvy. melting.	17.00*
No. 2 bundles	17.00*
No. 1 busheling	17.00*
Long turnings	\$9.50 to 10.00
Cast iron borings.	9.50 to 10.00
Bar crops and plate	19.50*
Structural and plate	19.50*
No. 1 cast	20.90*
Stove plate	17.00
Steel axles	18.00*
Scrap rails	18.50
Rerolling rails	20.50*
Angles & splice bars	20.50*
Rails 3 ft. & under	21.00*
Cast iron carwheels	16.50 to 17.00

YOUNGSTOWN

Per gross ton delivered to consumer:

No. 1 hvy. melting.	\$20.00*
No. 2 hvy. melting.	20.00*
Low phos. plate.	22.50*
No. 1 busheling	20.00*
Hydraulic bundles.	20.00*
Mach. shop turn.	\$13.50 to 14.00
Short shovel. turn.	16.50 to 16.50
Cast iron borings.	15.00 to 15.50

NEW YORK

Dealers' buying prices, per gross ton, on cars

No. 1 hvy. melting.	\$15.33*
No. 2 hvy. melting.	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	13.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
No. 1 cupola cast.	20.00*
Hvy. breakable cast	16.50*
Charging box cast.	19.00*
Stove plate	19.00*
Clean auto cast.	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:

No. 1 hvy. melting.	\$19.25*
No. 1 bundles.	19.25*
No. 2 bundles.	19.25*
No. 2 hvy. melting.	19.25*
Mach. shop turn.	14.25*
Shovelling turn.	16.25*
Cast iron borings.	15.25*
Mixed bor. & turn.	14.25*
No. 1 cupola cast.	20.00*
Stove plate	19.00*
Low phos. plate.	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels.	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:

No. 1 hvy. melting.	\$19.50*
No. 2 hvy. melting.	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.50*
No. 2 bundles.	19.50*
Mach. shop turn.	16.50*
Short shovel.	16.50*
No. 1 busheling.	19.50*
Steel axle turn.	18.00*
Low phos. billet and bloom crops	23.66*
Cast iron borings.	15.50*
Mixed bor. & turn.	14.50*
No. 2 busheling.	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting.	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling.	22.00*
Railroad malleable.	22.00*
Elec. furnace punch.	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:

RR. hvy. melting.	\$15.50 to \$16.25
No. 1 hvy. melting.	15.50 to 16.25
No. 2 hvy. melting.	14.50 to 15.25
No. 2 bales	13.50 to 14.25
No. 3 bales	9.50 to 10.59
Mach. shop turn.	7.00
Elec. furn. 1 ft., und.	15.50 to 17.00
No. 1 cupola cast.	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:

No. 1 hvy. melting.	\$14.00 to \$15.00
No. 2 hvy. melting.	13.00 to 14.00
No. 2 bales	12.00 to 13.00
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast.	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:

RR. hvy. melting	\$13.50
No. 1 hvy. melting.	13.50
No. 3 bundles.	11.50
Elec. furn. 1 ft., und.	\$16.00 to 17.00
No. 1 cupola cast.	20.00*

Comparison of Prices . . .

Advances Over Past Week in Heavy Type; Declines in *Italics*.

(Prices Are F.O.B. Major Basing Points)

Flat Rolled Steel: (Cents Per Lb.)	Jan. 30, 1945	Jan. 23, 1945	Dec. 26, 1944	Feb. 1, 1944
Hot rolled sheets*	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)*	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates*	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00

Tin and Terne Plate:

(Dollars Per Base Box)

	Jan. 30, 1945	Jan. 23, 1945	Dec. 26, 1944	Feb. 1, 1944
Tin plate, standard cokes	\$5.00	\$5.00	\$5.00	\$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30

Bars and Shapes:

(Cents Per Lb.)

	Jan. 30, 1945	Jan. 23, 1945	Dec. 26, 1944	Feb. 1, 1944
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40

Wire and Wire Products:

(Cents Per Lb.)

	Jan. 30, 1945	Jan. 23, 1945	Dec. 26, 1944	Feb. 1, 1944
Plain wire	2.60	2.60	2.60	2.60
Wire nails*	2.55	2.55	2.55	2.55

Rails:

(Dollars Per Gross Ton)

	Jan. 30, 1945	Jan. 23, 1945	Dec. 26, 1944	Feb. 1, 1944
Heavy rails*	\$40.00	\$40.00	\$40.00	\$40.00
Light rails*	40.00	40.00	40.00	40.00

Semi-Finished Steel:

(Dollars Per Gross Ton)

	Jan. 30, 1945	Jan. 23, 1945	Dec. 26, 1944	Feb. 1, 1944
Rerolling billets	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs, rerolling	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp:

(Cents Per Lb.)

	Jan. 30, 1945	Jan. 23, 1945	Dec. 26, 1944	Feb. 1, 1944
Wire rods	2.00	2.00	2.00	2.00
Skelp	1.90	1.90	1.90	1.90

Pig Iron:

(Per Gross Ton)

	Jan. 30, 1945	Jan. 23, 1945	Dec. 26, 1944	Feb. 1, 1944
No. 2 fdy., Philadelphia	\$25.84	\$25.84	\$25.84	\$25.84
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	25.11	25.11	25.11	23.94
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.34	25.34	25.34	25.34
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese†	135.00	135.00	135.00	135.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

†For carlots at seaboard.

Scrap:

(Per Gross Ton)

	Jan. 30, 1945	Jan. 23, 1945	Dec. 26, 1944	Feb. 1, 1944
Heavy melt'g steel, P'gh.	\$20.00	\$20.00	\$20.00	\$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.32	17.32	17.32	17.32
Low phos. plate, Youngs'n	22.50	22.50	22.25	22.50
No. 1 cast, Pittsburgh	20.00*	20.00*	20.00*	20.00
No. 1 cast, Philadelphia	20.00*	20.00*	20.00*	20.00
No. 1 cast, Chicago	20.00*	20.00*	20.00*	20.00

*F.o.b. shipping point.

Coke, Connellsville:

(Per Net Ton at Oven)

	Jan. 30, 1945	Jan. 23, 1945	Dec. 26, 1944	Feb. 1, 1944
Furnace coke, prompt	\$7.00	\$7.00	\$7.00	\$7.00
Foundry coke, prompt	8.25	8.25	8.25	8.25

Non-Ferrous Metals:

(Cents Per Lb. to Large Buyers)

	Jan. 30, 1945	Jan. 23, 1945	Dec. 26, 1944	Feb. 1, 1944
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin, del'd	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 134-143.

*For interim increase on delivered price granted by OPA as of Jan. 11, 1945, see detailed price tables.

Composite Prices . . .

FINISHED STEEL

January 30, 1945	2.33408c. a Lb.
One week ago	2.33408c. a Lb.
One month ago	2.30837c. a Lb.
One year ago	2.25513c. a Lb.

HIGH

LOW

1944	2.30837c., Sept.	5	2.272349c., Jan. 4
1943	2.25513c.,		2.25513c.,
1942	2.26190c.,		2.26190c.,
1941	2.43078c.,		2.43078c.,
1940	2.30467c., Jan.	2	2.24107c., Apr. 16
1939	2.35367c., Jan.	3	2.26689c., May 16
1938	2.58414c., Jan.	4	2.27207c., Oct. 18
1937	2.58414c., Mar.	9	2.32263c., Jan. 4
1936	2.32263c., Dec.	28	2.05200c., Mar. 10
1935	2.07642c., Oct.	1	2.06492c., Jan. 8
1934	2.15367c., Apr.	24	1.95757c., Jan. 2
1933	1.95578c., Oct.	3	1.75836c., May 2
1932	1.89196c., July	5	1.83901c., Mar. 1
1931	1.99626c., Jan.	13	1.86586c., Dec. 29
1930	2.25488c., Jan.	7	1.97319c., Dec. 9
1929	2.31773c., May	23	2.26498c., Oct. 29

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

PIG IRON

23.61 a Gross Ton	23.61 a Gross Ton
23.61 a Gross Ton	23.61 a Gross Ton
23.61 a Gross Ton	23.61 a Gross Ton
23.61 a Gross Ton	23.61 a Gross Ton

SCRAP STEEL

\$19.17 a Gross Ton	\$19.17 a Gross Ton
\$19.17 a Gross Ton	\$19.17 a Gross Ton
\$19.17 a Gross Ton	\$19.17 a Gross Ton
\$19.17 a Gross Ton	\$19.17 a Gross Ton

HIGH	LOW	LOW	HIGH
23.61	\$23.61	\$15.67, Oct. 24	\$19.17
23.61	23.61	19.17	19.17
23.61	23.61	19.17	19.17
\$23.61, Mar. 20	\$23.45, Jan. 2	\$19.17, Apr. 10	\$22.00, Jan. 7
23.45, Dec. 23	22.61, Jan. 2	16.04, Apr. 9	21.83, Dec. 30
22.61, Sept. 19	20.61, Sept. 12	14.08, May 16	22.50, Oct. 1
23.25, June 21	19.61, July 6	11.00, June 7	15.00, Nov. 22
23.25, Mar. 9	20.25, Feb. 16	12.67, June 8	21.92, Mar. 30
19.74, Nov. 24	18.73, Aug. 11	12.67, June 9	17.75, Dec. 21
18.34, Nov. 5	17.83, May 14	10.33, Apr. 29	13.42, Dec. 10
17.90, May 1	16.90, Jan. 27	9.50, Sept. 25	13.00, Mar. 18
16.90, Dec. 5	13.56, Jan. 8	6.75, Jan. 3	12.25, Aug. 8
14.81, Jan. 5	13.56, Dec. 6	6.43, July 5	8.50, Jan. 12
15.90, Jan. 6	14.79, Dec. 15	8.50, Dec. 29	11.33, Jan. 6
18.21, Jan. 7	15.90, Dec. 16	11.25, Dec. 9	15.00, Feb. 18
18.71, May 14	18.21, Dec. 17	14.08, Dec. 3	17.58, Jan. 29

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

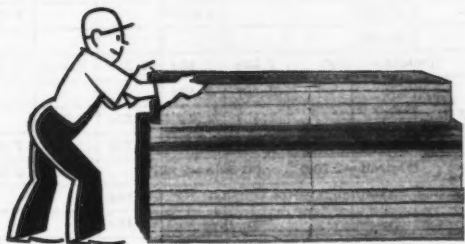
Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.



CONTINENTAL STEEL

A GOOD NAME TO REMEMBER

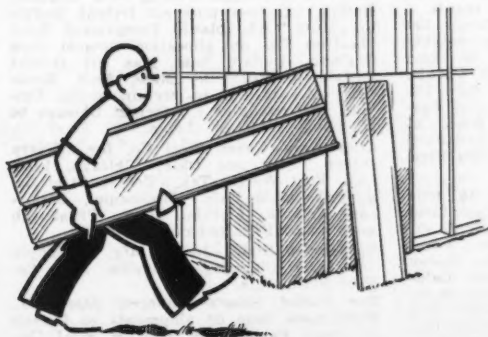
WHEN YOU NEED SHEET AND WIRE PRODUCTS



STEEL SHEETS

Open hearth steel from Continental's furnaces is made into steel sheets with more than thirty different types of surface treatments, finishes and coatings. Continental specializes in the production of sheets with properties designed to best fit a definite class of duties. This special service in sheets fitted to manufacturers needs helps cut production costs and make better products. Inquiries are invited.

*TRADEMARK REGISTERED
U. S. PATENT OFFICE



WIRE AND WIRE PRODUCTS

Small enough to stitch like thread or large enough to serve as lever rods on the army's big earth movers . . . that's Continental wire, made of open hearth steel from Continental's own furnaces. Wire for manufacturers is available in standard and special shapes and many different finishes and coatings. Continental's finished wire products include Chain Link fence, widely used for the protection of industrial property.



CONTINENTAL

STEEL CORPORATION

GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF:

MANUFACTURER'S WIRE: Bright, Annealed, Galvanized, Coppered, Tinned; Liquor Finished, Lead Coated, Special wire, etc. Also Chain Link Fence, Nails, etc.

STEEL SHEETS: Black, Galvanized, Hot Rolled Annealed, Hot Rolled Pickled, Long Terme, Copperior, Lead-Sealed, Galvannealed, Super-Metal, etc.

THE SUPERIOR SHEET STEEL COMPANY, DIVISION • CANTON, OHIO

Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 0.10c. per lb. under base; primes 0.25c. above base. (2) Unassorted 8-lb. coating. (3) Widths up to 12-in. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (11) Boxed. (12) Portland and Seattle price, San Francisco 2.50c. (13) This base price for annealed, bright finish wire, commercial spring wire. (14) Add 10c. per 100 lb. to delivered price—OPA interim increase, Jan. 11, 1945. (15) Add 15c. per 100 lb. to delivered price—OPA interim increase, Jan. 11, 1945. (16) Add 10c. per 100 lb. to delivered price of plates produced to sheared mill or universal mill width and length tolerances—OPA interim increase, Jan. 11, 1945.

Basing Point ↓ Product →	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Young- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	Pacific Ports, Cars	DELIVERED TO		
													Detroit	New York	Phila- delphia
Hot Rolled Sheets ¹	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.20¢	2.34¢	2.37¢
Cold Rolled Sheets ¹	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.15¢	3.39¢	3.37¢
Galvanized Sheets (24 gage) ¹	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.74¢	3.67¢
Enameling Sheets (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.45¢	3.71¢	3.67¢
Long Terns ¹	3.80¢	3.80¢	3.80¢									4.55¢		4.16¢	4.12¢
Hot Rolled Strip ²	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.20¢	2.40¢	
Cold Rolled Strip ⁴	2.90¢	2.90¢		2.80¢			2.80¢	(Worcester=3.00¢)					2.90¢	3.16¢	
Cooperage Stock Strip	2.20¢	2.20¢			2.20¢		2.20¢							2.56¢	
Commodity C-R Strip	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester=3.35¢)					3.05¢	3.31¢	
Coke Tin Plate, Base Box	\$5.00	\$5.00	\$5.00						\$3.10					5.36¢	5.32¢
25 Electro Tin Plate, Box	\$4.35	\$4.35	\$4.35						\$4.60						
50	\$4.50	\$4.50	\$4.50						\$4.75						
75	\$4.65	\$4.65	\$4.65												
Black Plate (20 gage) ⁵	3.65¢	3.65¢	3.65¢						3.15¢			4.95¢ ¹³			3.87¢
Mfg. Terns, Special Box	\$4.30	\$4.30	\$4.30						\$4.40						
Carbon Steel Bars	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			(Duluth=2.25¢)	2.50¢	2.80¢	2.25¢	2.40¢	2.47¢	
Rail Steel Bars ⁶	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.80¢				
Reinforcing (Billet) Bars ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		2.50¢	2.55¢ ¹³	2.25¢	2.39¢		
Reinforcing (Rail) Bars ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.50¢	2.55¢ ¹³	2.25¢		2.47¢	
Cold Finished Bars ⁸	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit=2.70¢)	(Toledo=2.80¢)			2.99¢	2.97¢	
Alloy Bars, Hot Rolled	2.70¢	2.70¢				2.70¢		(Bethlehem, Maastillon, Canton=2.70¢)					2.80¢		
Alloy Bars, Cold Drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.45¢		
Carbon Steel Plates ¹⁷	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.35¢		2.45¢	2.65¢	2.32¢	2.29¢	2.15¢
Floor Plates	3.35¢	3.35¢									3.70¢	4.00¢		3.71¢	3.67¢
Alloy Plates	3.50¢	3.50¢				(Coatesville=3.50¢)					3.95¢	4.15¢		3.70¢	3.50¢
Structural Shapes	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢		(Bethlehem=2.10¢)			2.45¢	2.75¢		2.27¢	2.215¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.90¢			2.80¢				(Worcester=3.00¢)							
0.51 to 0.75 Carbon	4.30¢			4.30¢				(Worcester=4.50¢)							
0.76 to 1.00 Carbon	6.15¢			6.15¢				(Worcester=6.35¢)							
1.01 to 1.25 Carbon	8.35¢			8.35¢				(Worcester=8.55¢)							
Bright Wire ¹⁴	2.60¢	2.60¢		2.60¢		2.60¢		(Worcester=2.70¢)	(Duluth=2.65¢)	3.10¢				2.92¢	
Galvanized Wire								Add proper size extra and galvanizing extra to Bright Wire base.							
Spring (High Carbon)	3.20¢	3.20¢		3.20¢				(Worcester=3.30¢)			3.70¢				3.52¢
Steel Sheet Piling	2.40¢	2.40¢				2.40¢					2.95¢				2.73¢

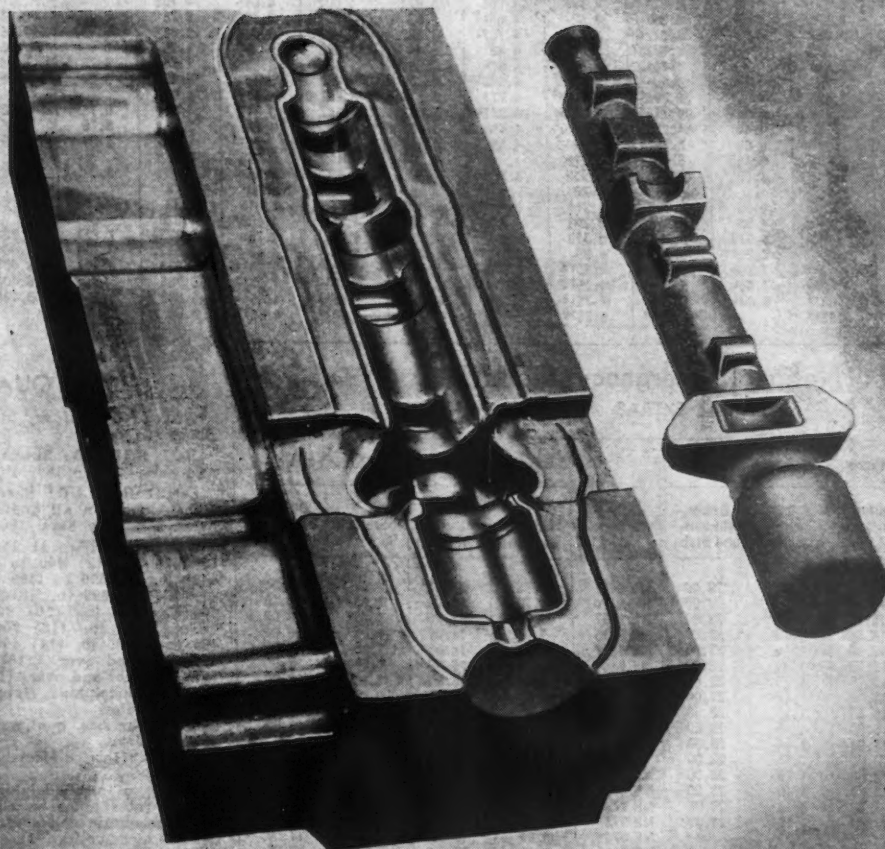
EXCEPTIONS TO PRICE SCHED. NO. 6
 Slabs—Andrews Steel Co. \$41 basing pts.;
 Wheeling Steel Corp. (rerolling) 4 in. sq. or larger \$37.75 f.o.b. Portsmouth, Ohio;
 Empire Sheet & Tin Plate Corp. \$41;
 Phoenix Iron Co. (rerolling) \$41, (forging) \$47; Granite City Steel \$47.50.
 Blooms—Phoenix Iron Co. (rerolling) \$41, (forging) \$47; Pgh. Steel Co. (reroll) \$38.25, (forging) \$44.25. Wheeling Steel Corp. (rerolling) 4 in. sq. or larger \$37.75 f.o.b. Portsmouth.
 Sheet bar—Empire Sheet & Tin Plate Co. \$39 mill; Wheeling Steel Corp. \$38 Portsmouth, Ohio.
 Billets, Forging—Andrews Steel Co. \$50 basing pts.; Follansbee Steel Corp. \$49.50 Toronto; Phoenix Iron Co. \$47.00 mill.
 Geneva Steel Co. \$64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. \$49.50.
 Billets, Rerolling—Continental Steel Corp. may charge Acme Steel in Chicago switching area \$34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) \$41 mill; Wheeling Steel Corp. 4 in. sq. or larger \$37.75, smaller \$39.50 f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at \$39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. \$41 mill; Continental Steel Corp. (1% x 1%) \$39.50, (2 x 2) \$40.00 Kokomo, Ind. (these prices include \$1 size extra); Keystone Steel & Wire Co. \$36.40 Peoria; Connors Steel Co. \$50.40 Birmingham; Ford Motor Co. \$34 Dearborn, Mich.; Geneva Steel Co. \$53.64 f.o.b. Pac. C. Pgt. Steel Co. \$43.50.

Structural Shapes—Phoenix Iron Co. \$23.55 basing pts. (export) \$25.00 Phoenixville; Knoxville Iron Co. \$23.30 basing points.
 Rails—Sweet Steel Co. (rail steel) \$50 mill; West Virginia Rail Co. (lightweight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp. \$45 Pueblo.
 Hot Rolled Plate—Granite City Steel Co. \$2.65 mill; Knoxville Iron Co. \$2.25 basing pts.; Kaiser Co. and Geneva Steel Co. \$2.20 Pacific Ports; Central Iron and Steel Co. \$2.50 basing points; Granite City Steel Co. \$2.35 Granite City.
 Merchant Bars—W. Ames Co., 10 tons and over, \$2.85 mill; Eckels-Nye Steel Corp., \$2.50 basing pts. (rail steel) \$2.40; Phoenix Iron Co. \$2.40 basing pts.; Sweet Steel Co. (rail steel) \$2.35 mill; Joslyn Mfg. & Supply Co., \$2.35 Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bar) \$2.35 Chicago; Knoxville Iron Co. \$2.30 basing pts.; Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill. Milton Mfg. Co. \$2.75 f.o.b. Milton, Pa.
 Pipe Skelp—Wheeling Steel Corp., Benwood, \$2.05 per cwt.
 Reinforcing Bars—W. Ames & Co., 10 tons and over, \$2.85 mill; Sweet Steel Co. (rail steel) \$2.35 mill; Columbia Steel Co. \$2.50 Pacific Ports.
 Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Mansfield, Mass.

f.o.b. Mansfield; Empire Finished Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass. f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.
 Alloy Bars—Texas Steel Co. for delivery except Texas and Okla. Chicago, base, f.o.b. Fort Worth, Tex.; Connors Steel Co. shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.
 Hot Rolled Strip—Joslyn Mfg. & Supply Co. \$2.30 Chicago; Knoxville Iron Co. \$2.25 basing pts.
 Hot Rolled Sheets—Andrews Steel Co., Middletown base on shipments to Detroit or area; Parkersburg Iron & Steel Co., \$2.25 Parkersburg.
 Galvanized Sheets—Andrews Steel Co. \$2.75 basing pts.; Parkersburg Iron & Steel Co. \$3.85 Parkersburg; Continental Steel Co., Middletown base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.
 Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.
 Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is \$2.45 per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

T & W FORGINGS

Usually Cost Less at the Point of Assembly



**How Much Time Does it Cost You to Machine
and Finish the Forgings You Use?**

**There's Where the Difference Occurs.
Ask a T & W Forging Engineer About it.**

TRANSUE & WILLIAMS

STEEL FORGING CORPORATION • ALLIANCE, O.

SALES OFFICES: NEW YORK, PHILADELPHIA, CHICAGO, INDIANAPOLIS, DETROIT AND CLEVELAND

PRICES

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule 49.

Cities	SHEETS			STRIP		Plates 1/4 in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 8617-20	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 8617-20	Cold Drawn, NE 9442-45 Ann.
Philadelphia	3.518	4.872 ^a	5.018 ^a	3.922	4.772	3.605	3.666	3.822	4.072	5.966	7.066	7.272	8.322
New York	3.590	4.613 ^a	5.010	3.974 ^a	4.772	3.768	3.758	3.853	4.103	6.008	7.108	7.303	8.353
Boston	3.744	4.744 ^a	5.224 ^a	4.106	4.715	3.912	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore	3.394	4.852	4.894	3.902	4.752	3.594	3.759	3.802	4.052	.....	.....	.....	.....
Norfolk	3.771	4.965	5.371	4.165	4.885	3.971	4.002	4.065	4.165	.....	.....	.....	.....
Chicago	3.25	4.20	5.231	3.60	4.651 ⁷	3.55	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee	3.387	4.337 ^a	5.272 ^a	3.737	4.787 ¹⁷	3.687	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland	3.35	4.40	4.874 ^a	3.60	4.45	3.40	3.588	3.35	3.75	5.956	7.056	6.85	7.90
Buffalo	3.35	4.40	4.75 ^a	3.819	4.689	3.83	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit	3.45	4.50	5.00 ^a	3.70	4.689 ¹⁷	3.609	3.661	3.45	3.80	6.06	7.16	7.199	8.209
Cincinnati	3.425	4.475 ^a	4.825 ^a	3.675	4.711	3.611	3.691	3.611	4.011	.....	.....	.....	.....
St. Louis	3.397	4.347 ^a	5.172 ^a	3.747	4.831 ¹⁷	3.697	3.697	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh	3.35	4.40	4.75	3.60	4.45	3.40	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul	3.51	4.48	5.257 ^a	3.66	4.351 ⁷	3.811 ^a	3.811 ^a	3.761 ^a	4.361	6.09	7.19	7.561	8.711
Omaha	3.865	5.443	5.608 ^a	4.215	.....	4.165	4.165	4.115	4.43	.....	.....	.....	.....
Indianapolis	3.58	3.58	4.568	4.918	.....	4.78	3.63	3.58	3.98	6.08	7.18	7.18	8.23
Birmingham	3.45	.....	4.75	3.70	.....	3.55	3.55	3.50	4.43	.....	.....	.....	.....
Memphis	3.865 ⁷	4.66	3.265	4.215	.....	4.065	4.065	4.015	4.33	.....	.....	.....	.....
New Orleans	4.058 ^a	4.95	5.358	4.308	.....	4.158	4.158 ^a	4.108 ^a	4.629	.....	.....	.....	.....
Houston	3.763	5.573	6.313 ^a	4.313	.....	4.25	4.25	3.75	6.373 ^a	7.223	8.323	8.323	9.373
Los Angeles	5.00	7.20 ^a	6.10 ^a	4.95	5.613 ¹⁵	4.95	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco	4.551 ⁴	7.30 ^a	6.35 ^a	4.501 ⁴	7.333 ¹⁷	4.651 ⁴	4.351 ⁴	4.151 ⁴	5.333	8.304	9.404	9.404	10.454
Seattle	4.651 ²	7.05 ^a	5.95 ^a	4.251 ²	.....	4.751 ²	4.451 ²	4.351 ²	5.783	.....	9.404	.....	.....
Portland	4.651 ²	6.60 ^a	5.75 ^a	4.751 ¹	.....	4.751 ¹	4.451 ¹	4.451 ¹	5.533	8.304	9.404	8.304	9.404
Salt Lake City	4.531 ⁷	.....	6.171 ⁸	5.531 ⁷	.....	4.981 ⁷	4.681 ⁷	4.681 ⁷	5.90	.....	.....	.....	.....

National Emergency Steels MILL EXTRAS

Designa- tion	Basic Open-Hearth		Electric Furnace		Designa- tion	Basic Open-Hearth		Electric Furnace	
	Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs		Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs
NE 8612	0.65 ^a	\$13.00	\$1.15	\$23.00	NE 9427	0.75	15.00	1.25	25.00
NE 8615	0.65	13.00	1.15	23.00	NE 9430	0.75	15.00	1.25	25.00
NE 8617	0.65	13.00	1.15	23.00	NE 9432	0.75	15.00	1.25	25.00
NE 8620	0.65	13.00	1.15	23.00	NE 9435	0.75	15.00	1.25	25.00
NE 8622	0.65	13.00	1.15	23.00	NE 9437	0.75	15.00	1.25	25.00
NE 8625	0.65	13.00	1.15	23.00	NE 9440	0.80	15.00	1.25	25.00
NE 8627	0.65	13.00	1.15	23.00	NE 9442	0.80	15.00	1.25	25.00
NE 8630	0.65	13.00	1.15	23.00	NE 9445	0.80	15.00	1.30	26.00
NE 8632	0.65	13.00	1.15	23.00	NE 9447	0.80	15.00	1.30	26.00
NE 8635	0.65	13.00	1.15	23.00	NE 9450	0.80	15.00	1.30	26.00
NE 8637	0.65	13.00	1.15	23.00	NE 9722	0.68 ^a	\$13.00	\$1.15	\$23.00
NE 8640	0.65	13.00	1.15	23.00	NE 9727	0.65	13.00	1.15	23.00
NE 8642	0.65	13.00	1.15	23.00	NE 9732	0.65	13.00	1.15	23.00
NE 8645	0.65	13.00	1.15	23.00	NE 9737	0.65	13.00	1.15	23.00
NE 8647	0.65	13.00	1.15	23.00	NE 9742	0.65	13.00	1.15	23.00
NE 8650	0.65	13.00	1.15	23.00	NE 9745	0.65	13.00	1.15	23.00
NE 8712	0.70 ^a	\$14.00	\$1.20	\$24.00	NE 9747	0.65	13.00	1.15	23.00
NE 8715	0.70	14.00	1.20	24.00	NE 9750	0.65	13.00	1.15	23.00
NE 8717	0.70	14.00	1.20	24.00	NE 9753	0.65	13.00	1.15	23.00
NE 8720	0.70	14.00	1.20	24.00	NE 9756	0.65	13.00	1.15	23.00
NE 8722	0.70	14.00	1.20	24.00	NE 9758	0.65	13.00	1.15	23.00
NE 8725	0.70	14.00	1.20	24.00	NE 8830	\$1.30	\$26.00	\$1.80	\$36.00
NE 8727	0.70	14.00	1.20	24.00	NE 9832	1.30	26.00	1.80	36.00
NE 8730	0.70	14.00	1.20	24.00	NE 9835	1.30	26.00	1.80	36.00
NE 8732	0.70	14.00	1.20	24.00	NE 9837	1.30	26.00	1.80	36.00
NE 8735	0.70	14.00	1.20	24.00	NE 9840	1.30	26.00	1.80	36.00
NE 8737	0.70	14.00	1.20	24.00	NE 9842	1.30	26.00	1.80	36.00
NE 8740	0.70	14.00	1.20	24.00	NE 9845	1.30	26.00	1.80	36.00
NE 8742	0.70	14.00	1.20	24.00	NE 9847	1.30	26.00	1.80	36.00
NE 8745	0.70	14.00	1.20	24.00	NE 9850	1.30	26.00	1.80	36.00
NE 8747	0.70	14.00	1.20	24.00	NE 9912	\$1.20	\$24.00	\$1.55	\$31.00
NE 8750	0.70	14.00	1.20	24.00	NE 9915	1.20	24.00	1.55	31.00
NE 9415	0.75 ^a	\$15.00	\$1.25	\$25.00	NE 9917	1.20	24.00	1.55	31.00
NE 9417	0.75	15.00	1.25	25.00	NE 9920	1.20	24.00	1.55	31.00
NE 9420	0.75	15.00	1.25	25.00	NE 9922	1.20	24.00	1.55	31.00
NE 9422	0.75	15.00	1.25	25.00	NE 9925	1.20	24.00	1.55	31.00
NE 9425	0.75	15.00	1.25	25.00					

Note 1: The ranges shown are restricted to sizes 100 sq. in. or less or equivalent cross-sectional area 18 in. wide or under, with a maximum individual piece weight of 7000 lb. irrespective of size. Note 2: For steels ordered to such ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table 4, Section 10, A.I.S.I. Steel Products Manual. Note 3: When acid open-hearth is specified and acceptable, add to basic open-hearth alloy differential 0.25c. per lb. for bars and bar strip and \$5 per gross ton for billets, blooms and slabs. Note 4: The extras shown are in addition to the base price of \$2.70 for 100 lb. on finished products and \$54 per gross ton on semi-finished steel, major basing points, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. The full extra applicable over the base price is the total of all extras indicated by the specific requirements of the order. The higher extra shall be charged for any size falling between two published extras.

BASE QUANTITIES

Standard unless otherwise keyed on prices.

HOT ROLLED: Sheets, strip, plates, shapes and bars, 400 to 1999 lb.

COLD ROLLED: Sheets, 400 to 1499 lb.; strip, extras on all quantities; bars, 1500 lb. base; NE alloy bars, 1000 to 3999 lb.

EXCEPTIONS: (1) 150 to 499 lb. (2) 150 to 1499 lb. (3) 400 to 1499 lb. (4) 450 to 1499 lb. (5) 500 to 1499 lb. (6) 0 to 1999 lb. (7) 400 to 1999 lb. (8) 1000 to 1999 lb. (9) 450 to 3749 lb. (10) 400 to 3999 lb. (11) 300 to 4999 lb. (12) 300 to 10,000 lb. (13) 400 to 14,999 lb. (14) 400 lb. and over. (15) 1000 lb. and over. (16) 1500 lb. and over. (17) 2000 lb. and over. (18) 3500 lb. and over.

(*) Philadelphia: Galvanized sheet, 25 or more bundles.

Extra for size, quality, etc., apply on above quotations.

*Add 0.271c. for sizes not rolled in Birmingham.

**City of Philadelphia only. Applicable freight rates must be added to basing point prices to obtain delivered price to other localities in metropolitan area.

LAKE SUPERIOR ORES

(51.50% Fe, Natural Content, Delivered Lower Lake Ports*)

Per Gross Ton
Old range, bessemer, 51.50 \$4.75
Old range, non-bessemer, 51.50 4.60
Mesaba, bessemer, 51.50 4.60
Mesaba, non-bessemer, 51.50 4.45
High phosphorus, 51.50 4.35

*Adjustments are made to indicate prices based on variance of Fe content of ores as analyzed on a dry basis by independent laboratories.

FLUORSPAR

Maximum price f.o.b. consumer's plant, \$30 per short ton plus either (1) rail freight from producer to consumer, or (2) rail freight from Rosiclare, Ill., to consumer, whichever is lower.

Exception

When the WPB Steel Division certifies in writing the consumer's need for one of the higher grades of metallurgical fluorspar specified in the table below the price shall be taken from the table plus items (1 and 2) from paragraph above.

Base price per short ton
Effective CaF₂ Content:
70% or more \$55.00
65% but less than 70% 52.00
60% but less than 65% 51.00
Less than 60% 50.00

PRICES

SEMI-FINISHED STEEL

Ingot, Carbon, Re-rolling
Base per gross ton, f.o.b. mill... \$31.00
Exceptions: Phoenix Iron Co. may charge \$33.75; Kaiser Co., \$43.00 f.o.b. Pacific Coast ports; Empire Sheet & Tinplate Co., \$34.25; Fgh. Steel Co., \$33.10.

Ingot, Carbon, Forging
Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown... \$36.00
Exceptions: Phoenix Iron Co. may charge \$43.00; Empire Sheet & Tinplate Co., \$39.25, f.o.b. Mansfield, Ohio; West Coast producers, \$48.00, f.o.b. Pacific Coast Ports; Fgh. Steel Co., \$38.10.

Ingot, Alloy
Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh... \$45.00
Exceptions: C/L delivered Detroit add \$1.00; delivered East Michigan add \$1.00; Connors Steel Co may charge \$5.00 f.o.b. Birmingham.

Billets, Blooms and Slabs
Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (re-rolling only). Prices delivered Detroit are \$2.00 higher; delivered E. Michigan, \$3 higher; f.o.b. Duluth, billets only, \$2.00 higher; billets f.o.b. Pacific ports are \$12 higher. Provo, \$11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

Per Gross Ton
Re-rolling... \$34.00
Forging quality... \$40.00
For exceptions on the page of finished steel prices.

Alloy Billets, Blooms, Slabs
Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem, per gross ton... \$54.00
Price delivered Detroit \$2.00 higher; E. Michigan, \$3.00 higher.

Shell Steel
Per Gross Ton
1 in. to 12 in. \$52.00
12 in. to 18 in. 54.00
18 in. and over 56.00
Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are \$2.00 higher; E. Michigan, \$3 higher.
Price Exception: Follansbee Steel Corp. permitted to sell at \$13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of \$12.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars
Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

Per Gross Ton
Open hearth or bessemer \$34.00

Skelp
Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.
Grooved, universal and sheared .. 1.90c.

Wire Rods
(No. 5 to 9/32 in.)

Per Lb.
Pittsburgh, Chicago, Cleveland ... 2.00c.
Worcester, Mass. 2.10c.
Birmingham 2.00c.
San Francisco 2.50c.
Galveston 2.25c.
9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

Base per lb.
High speed 67c.
Straight molybdenum 54c.
Tungsten-molybdenum 57 1/2c.
High-carbon-chromium 43c.
Oil hardening 24c.
Special carbon 22c.
Extra carbon 18c.
Regular carbon 14c.
Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 1c. higher.



How to avoid "going out on a limb" with your post-war re-tooling investment

... by tooling up with flexible, low-cost Delta-Milwaukee Machine Tools

You maintain volume and quality ... with big savings. War production experience proves it!

Delta's modern conception of tool design provides you with a practical approach to the uncertainties that lie ahead:

You substantially cut your fixed investment in machine tools ... retain more liquid working capital for other post-war needs.

Delta cost savings are due to modern production methods applied to a large volume of standard models; not to short-cuts in quality.

By utilizing the portability and compactness of Delta-Milwaukee Machine Tools, you can revise production line layouts for increased output per man-hour — at marked savings in conversion time. Yet you stay flexible — so that you can rapidly adapt to changing conditions.

Using standard stock-model Delta elements, you can modernize obsolete machines by replacing worn units. You can build high-production, special-purpose machines that can be quickly converted to new uses, when necessary.

Don't put yourself in a position where burdensome commitments for costly, inflexible machines impair your ability to adjust to shifting conditions. Save money ... stay adaptable — with Delta-Milwaukee Machine Tools.

MA-16

Above: An outstanding example of the adaptation of a standard Delta-Milwaukee Shaper to an especially tough job — shaping magneto timing cams to exact tolerance of .0005". Thus a \$35.00 machine does a job which could be done no better by the grinding machine ordinarily used for this work and costing about \$1500.00. The addition of a special fixture was necessary in either case, so the fixture cost remained the same.

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Please send my free copies of Delta's 76-page Blue Book and catalog of low-cost machine tools.

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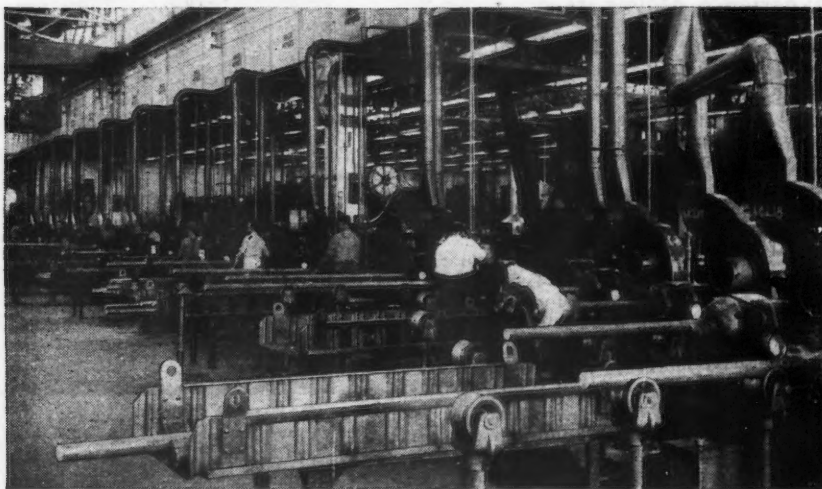
provides 140 case histories of valuable war production experience that may suggest similar money-saving applications in your plant. Also available is a catalog of low-cost Delta-Milwaukee Machine Tools. Request both, using coupon below.

PRODUCTION UP! REJECTIONS DOWN! *Another* PROBLEM SOLVED

THE PROBLEM: To cut off slugs from 2 3/8" diameter bars of heat-resisting steel to be used for making aircraft valves. Former method caused fractures in the metal—high rejections—failures in service. Necessary to anneal stock before cutting.

THE SOLUTION: Campbell 401 Cutamatic Wet Abrasive Cutting Machine. Stock is cut unannealed (saving annealing cost). Cut in one-fourth time. Slugs are cut within weight limits—have square ends for easy extruding.

AND SO . . . as production requirements grew, more Campbell machines were added. Now there are 32 on this job.



Your production problem may be totally different from this one—yet Campbell may be able to help you solve it. We'll be glad to talk it over with you.

Campbell
ABRASIVE CUTTING MACHINES

ACCO ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

ANDREW C. CAMPBELL DIVISION
AMERICAN CHAIN & CABLE • BRIDGEPORT, CONN.

TRADE MARK

PRICES

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
(F.o.b. Pittsburgh only on wrought pipe)
Base Price—\$200.00 per Net Ton

Steel (Butt Weld)

	Black	Galv
1/2 in.	63 1/2	51
3/4 in.	66 1/2	55
1 to 3 in.	68 1/2	57 1/2

Wrought Iron (Butt Weld)

1/2 in.	24	3 1/2
3/4 in.	30	10
1 and 1 1/4 in.	34	16
1 1/2 in.	38	18 1/2
2 in.	37 1/2	18

Steel (Lap Weld)

2 in.	61	49 1/2
2 1/2 in and 3 in.	64	52 1/2
3 1/2 to 6 in.	66	54 1/2

Wrought Iron (Lap Weld)

2 in.	30 1/2	12
2 1/2 to 3 1/2 in.	31 1/2	14 1/2
4 in.	33 1/2	18
4 1/2 to 8 in.	32 1/2	17

Steel (Butt, extra strong, plain ends)

1/2 in.	61 1/2	50 1/2
3/4 in.	65 1/2	54 1/2
1 to 3 in.	67	57

Wrought Iron (Same as Above)

1/2 in.	25	6
3/4 in.	31	12
1 to 2 in.	38	19 1/2

Steel (Lap, extra strong, plain ends)

2 in.	59	48 1/2
2 1/2 and 3 in.	63	52 1/2
3 1/2 to 6 in.	66 1/2	56

Wrought Iron (Same as Above)

2 in.	33 1/2	15 1/2
2 1/2 to 4 in.	39	22 1/2
4 1/2 to 6 in.	37 1/2	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher on all butt weld.

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago . . .	\$54.80
6-in. and larger, del'd New York . . .	52.2
6-in. and larger, Birmingham . . .	46.0
6-in. and larger f.o.b. cars, San Francisco or Los Angeles . . .	69.4
6-in. and larger f.o.b. cars, Seattle . . .	71.2
Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are \$45 at Birmingham and \$53.80 delivered Chicago, \$59.40 at San Francisco and Los Angeles, and \$70.20 at Seattle. Delivered prices do not reflect new 3 percent tax on freight rates.	

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes
Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Cold Drawn	Hot Rolled	Lap Weld Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.3
2 1/2 in. o.d. 12 B.W.G.	20.21	17.54	16.5
3 in. o.d. 12 B.W.G.	22.48	19.50	18.3
3 1/2 in. o.d. 11 B.W.G.	28.37	24.62	23.1
4 in. o.d. 10 B.W.G.	35.20	30.54	28.6

(Extras for less carload quantities)
40,000 lb. or ft. and over Base
30,000 lb. or ft. to 39,999 lb. or ft. 5%
20,000 lb. or ft. to 29,999 lb. or ft. 10%
10,000 lb. or ft. to 19,999 lb. or ft. 20%
5,000 lb. or ft. to 9,999 lb. or ft. 30%
2,000 lb. or ft. to 4,999 lb. or ft. 45%
Under 2,000 lb. or ft. 65%

PRICES

WIRE PRODUCTS

to the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Basing Points Named	Pacific Coast Basing Points
Standard wire nails....	\$2.25†	\$3.05†
Coated nails	2.25†	3.05†
But nails, carloads	4.10	.....
Base per 100 lb.		
Annealed fence wire...	\$3.05	\$3.55
Annealed galv. fence wire	3.40	3.90
Base Column		
Woven wire fence*	.67	.35
Fence posts, carloads...	.69	.86
Single loop bale ties...	.59	.84
Galvanized barbed wire**	.70	.80
Twisted barless wire..	.70	.....

*15 1/2 gage and heavier. **On 80-rod spools in carload quantities.

†Prices subject to switching or transportation charges.

‡Add 25c. per 100 lb. to delivered price—OPA Interim Increase, Jan. 11, 1945.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Base discount less case lots
Per Cent Off List	
1/2 in. & smaller x 6 in. & shorter....	65 1/2
3/16 & 1/2 in. x 6 in. & shorter.....	63 1/2
3/4 to 1 in. x 6 in. shorter.....	61
1 1/2 in. and larger, all lengths.....	59
All diameters over 6 in. long.....	59
Lag, all sizes	62
Flow bolts	65

Nuts, Cold Punched or Hot Pressed:

	(Hexagon or Square)
1/2 in. and smaller	62
3/16 to 1 in. inclusive.....	59
1 1/2 to 1 3/4 in. inclusive.....	57
1 3/4 in. and larger	56
On above bolts and nuts, excepting	
pilot bolts, additional allowance of 10	
per cent for full container quantities.	
There is an additional 5 per cent allowance	
for carload shipments.	

Semi-Fin. Hexagon Nuts U.S.S. S.A.E.

	Base discount less keg lots
7/16 in. and smaller.....	64
1/2 in. and smaller	62
3/4 in. through 1 in.	60
1 1/16 in. through 1 in.	59
1 1/8 in. through 1 1/2 in.	57
1 1/4 in. and larger.....	56
In full keg lots, 10 per cent additional discount.	

Stove Bolts

	Consumer
Packages, nuts loose	71 and 10
In packages, with nuts attached....	71
In bulk	80
On stove bolts freight allowed up to	
35c. per 100 lb. based on Cleveland, Chi-	
cago, New York on lots of 200 lb. or over.	

Large Rivets

	(1/2 in. and larger)
Base per 100 Lb.	
F.o.b. Pittsburgh, Cleveland, Chi-	
cago, Birmingham	\$3.75

Small Rivets

	(7/16 in. and smaller)
Per Cent Off List	
F.o.b. Pittsburgh, Cleveland, Chicago,	
Birmingham	65 and 5

Cap and Set Screws

	Consumer
Per Cent Off List	
Upset full fin. hexagon head cap	
screws, coarse or fine thread, up to	
and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes....	36
Fillister head cap, listed sizes.....	51
Freight allowed up to 65c. per 100 lb.	
based on Cleveland, Chicago or New York	
on lots of 200 lb. or over.	

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C....	\$6.00	\$12.00
15-lb. coating I.C....	7.00	14.00
20-lb. coating I.C....	7.50	15.00

ARMSTRONG



New drawings, new operations, but the same ARMSTRONG TOOL HOLDERS

When war came, thousands of plants laid aside their prints and their gauges, re-arranged their schedules, and with the same ARMSTRONG TOOL HOLDERS which they had used for civilian manufacturing, turned to the production of war materials. In the same manner, after victory, it will be with new drawings and these same ARMSTRONG TOOL HOLDERS, that normal peace time production will be resumed on lathes, planers, slotters and shapers.

Permanent, multi-purpose tools, used in over 96% of the machine shops and tool rooms, ARMSTRONG TOOL HOLDERS are essential to American Industry, in peace or war. They are the standard tools for basic machining operations, which with American ingenuity have built and will rebuild America's production greatness.

Whatever your post-war plan or product, you will probably start operation with ARMSTRONG TOOL HOLDERS. Check now to see that you are well supplied with the types and sizes you will need.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

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Eastern Whse. and Sales:

199 Lafayette St., N. Y. 12, N. Y.

Pacific Coast Whse. & Sales Office:

1275 Mission St., San Francisco 3, Calif.



ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

PRICES

PIG IRON

All prices set in bold face type are maximum established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maximum. Delivered prices do not reflect 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston	\$25.50	\$25.00	\$26.50	\$26.00		
Brooklyn	27.50	27.00		28.00		
Jersey City	26.53	26.03	27.53	27.03		
Philadelphia (4)	25.84	25.34	26.84	26.34	\$30.74	
Bethlehem	\$25.00	\$24.50	\$26.00	\$25.50		
Everett, Mass.	25.00	24.50	26.00	25.50		
Swadeland, Pa.	25.00	24.50	26.00	25.50		
Steelton, Pa.		24.50			\$29.50	
Birdsboro, Pa. (3)	25.00	24.50	26.00	25.50	29.50	
Sparrows Point, Md.	25.00	24.50				
Erie, Pa.	24.00	23.50	25.00	24.50		
Neville Island, Pa.	24.00	23.50	24.50	24.00		
Sharpsville, Pa. (1)	24.00	23.50	24.50	24.00		
Buffalo	24.00	23.00	25.00	24.50	29.50	
Cincinnati, Ohio	25.11	24.61		25.11		
Canton, Ohio	25.39	24.89	25.89	25.39	32.69	
Mansfield, Ohio	25.94	25.44	26.44	25.94	32.66	
St. Louis	24.50	24.50				
Chicago	24.00	23.50	24.50	24.00	35.46	\$37.34
Granite City, Ill.	24.00	23.50	24.50	24.00		
Cleveland	24.00	23.50	24.50	24.00	32.42	
Hamilton, Ohio	24.00	23.50		24.00		
Toledo	24.00	23.50	24.50	24.00		
Youngstown	24.00	23.50	24.50	24.00	32.42	
Detroit	24.00	23.50	24.50	24.00		
Lake Superior Fe.						34.00
Lyles, Tenn., Fe. (2)						33.00
St. Paul	26.63	26.13	27.10	26.63	39.80	
Duluth	24.50	24.00	25.00	24.50		
Birmingham	20.38	19.00	25.00			
Los Angeles	26.95					
San Francisco	26.95					
Seattle	26.95					
Provo, Utah	22.00	21.50				
Montreal	27.50	27.50		28.00		
Toronto	25.50	25.50		26.00		

GRAY FORGE IRON: Valley or Pittsburgh furnace

\$23.50

(1) Pittsburgh Coke & Iron Co. (Sharpesville, Pa., furnace only) and the Struthers Iron & Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable. Struthers Iron & Steel Co. may add another \$1.00 per gross ton for iron from Struthers, Ohio, plant.

(2) Price shown is for low-phosphorus iron; high phosphorus sells for \$28.50 at the furnace.

(3) E. & G. Brooke Co., Birdsboro, Pa. permitted to charge \$1.00 per ton extra.

(4) Pittsburgh Ferromanganese Co. (Chester furnace only) may charge \$2.25 a ton over maximum basing point prices.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, \$2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and \$1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.o.b. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh 21½ to 23½c.

Copper, reduced, 150 and 200 mesh 20½ to 25½c.

Iron, commercial, 100 and 200 mesh 96 + % Fe 13½ to 15c.

Iron, crushed, 200 mesh and finer, 90 + % Fe, carload lots 4c.

Iron, hydrogen reduced, 300 mesh and finer, 98½ + % Fe, drum lots 63c.

Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe 30 to 33c.

Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe 42c.

Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe 90c.

Aluminum, 100 and 200 mesh, *23 to 27c.

Antimony, 100 mesh 20.6c.

Cadmium, 100 mesh \$1.

Chromium, 150 mesh \$1.03.

Lead, 100, 200 & 300 mesh, 11½ to 12½c.

Manganese, 150 mesh 61c.

Nickel, 150 mesh 51½c.

Solder powder, 100 mesh, 8½c. plus metal.

Tin, 100 mesh 58½c.

Tungsten metal powder, 98%-99%, any quantity, per lb. \$2.60.

Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb. \$3.40.

Under 100 lb. \$3.00.

*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton
Connellsville, Pa.	\$7.00*
Foundry, beehive (f.o.b. oven)	
Fayette Co., W. Va.	8.10
Connellsville, Pa.	8.25
Foundry, By-Product	
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge \$7.75 per ton plus transportation charges.



ANY METAL • ANY PERFORATION

Industrial—Well balanced screens of excellent material and workmanship to assure maximum screen production combined with durability.

Ornamental—Approved patterns and finishes including many exclusive and characteristic designs for grilles and furniture. We invite your inquiries.

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Eastern Office, 114 Liberty Street, New York 6, N. Y.

PRICES

REFRACTORIES (F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis.....	\$64.00
First quality, Pa., Md., Ky., Mo., Ill.	51.30
First quality, New Jersey.....	56.00
Sec. quality, Pa., Md., Ky., Mo., Ill.	46.55
Sec. quality, New Jersey.....	51.00
No. 1 Ohio.....	43.00
Ground fire clay, net ton.....	7.60

Silica Brick

Pennsylvania and Birmingham	\$51.30
Chicago District	58.90
Silica cement, net ton (Eastern) ..	9.00

Chrome Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	\$54.00

Magnesite Brick

Standard, Balt. and Chester	\$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	\$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RAILS, TRACK SUPPLIES (F.o.b. Mill)

Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	\$40.00
Angle splice bars, 100 lb.	2.70
(F.o.b. Basing Points) Per Gross Ton	
Light rails (from billets)	\$40.00
Light rails (from rail steel)	39.00
Base per Lb.	
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plate, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to rail- roads	5.00c.
Track bolts, jobbers discount	63-5
Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone— Steelton, Pa., Buffalo. Cut spikes alone— Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c. *Add \$3.00 per gross ton to delivered price —OPA interim increase, Jan. 11, 1945.	

CORROSION AND HEAT- RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.10c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F. Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hot strip	17.00c.	17.50c.	24.00c.	35.00c.
Cold strip	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.
*Includes annealing and pickling.	

ELECTRICAL SHEETS (Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.
F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.	



LEE

Quality Springs

ALL SHAPES • ALL SIZES • ALL MATERIALS

LEE SPRING COMPANY, Inc.

30 MAIN STREET
BROOKLYN, N.Y.



GEAR TESTS

made with plastic models



Actual observation of why and how a gear tooth fails under excessive load is possible with Photoelastic equipment and plastic gear models now being used by Fairfield in research work on the strength of gears.

This is a visual check on the findings made by use of formulae, and a distinct advance in the science of gear making. A polarized light is passed through transparent gear models and the image on the screen shows in color the lines of stress which develop; permanent records are made by substituting a camera for the screen.

Gears are a primary factor in machinery, and Fairfield, backed by 25 years of experience, plus scientific research and modern inspection methods, can be relied upon to build into gears that superior quality essential for satisfactory use.

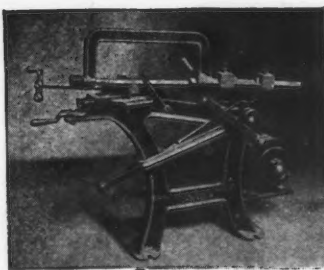
In anticipation of future production, investigate Fairfield facilities for making fine gears—write for our brochure on gears.

FAIRFIELD MFG. CO.

305 So. Earl Avenue
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FAIRFIELD for FINE GEARS



80%
of all Small Shop
Saws are "Marvels"!

No. 1 Draw Cut Hack Saw
Dry cut, 4" x 4" capacity. A
sturdy saw well-known for its
dependability, economy, and
invaluable service in the small
shop or shop department.
Simple and efficient with low
original, maintenance, and
blade cost.

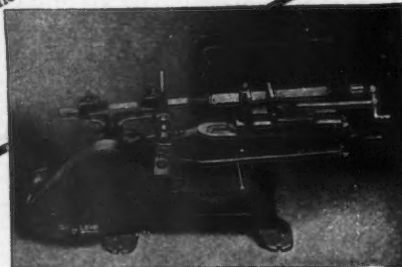
MARVELSAWS

No. 2 Draw Cut Hack Saw. Companion to the
No. 1 but with a normal 6" x 8" capacity
which can be increased to 8" x 8" by shorten-
ing the stroke with adjustable crank. The
No. 2 MARVEL also has a swivel vise which
is removable from the "T" slotted bed, per-
mitting special fixtures to be mounted. Motor
driven models are available in belt and motor
driven models. Motor driven models can also
be furnished mounted on portable truck.

Complete Range of Metal Sawing Machines

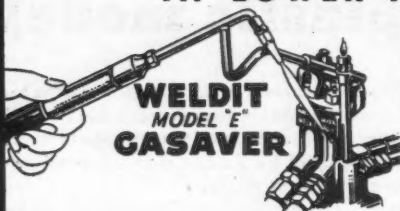
Being the largest exclusive manu-
facturer of metal sawing machines
and blades, both hack saw and
band saw type, we have the cor-
rect answer to your cut-off prob-
lems. Each MARVEL model has a
distinct application, so write us
and we will send our catalog, price,
and recommendation for the saw
to fill your requirements most
efficiently. MARVEL sawing engi-
neers are also available to discuss
and analyze your cut-off work.
(Without obligation of course)

ARMSTRONG-BLUM MFG. CO.
5700 W. Bloomingdale Ave., Chicago 39, Illinois, U. S. A.



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**WELDIT
MODEL "E"
GASAVER**

The Weldit Gasaver shuts off the welding
flame when not in use. . . . Conserves
essential materials by cutting oxygen and
acetylene consumption as much as fifty
per cent. Prevents injury to workmen—or
sudden fires—from dangerous idle torch
flames. . . . Adjustment remains unaltered
between welds.

When the Weldit Gasaver has been installed, you simply hang
idle torch on the handy lever rod. Weight of torch pulls rod
down, thus automatically shutting off supply lines. Relight
instantly by passing torch over Gasaver pilot light. No bother.
. . . No time lost. . . No readjusting required. . . Price
\$10.00 at Detroit. Order today.

Better Soldering, Annealing and Heating Jobs



**WELDIT
MODEL "CW"
BLOW
TORCH**

The Weldit Model CW Blowpipe is in
daily use by many foremost industrial
plants. . . . Built in accordance with the
recommendations of leading fabricators of
sheet metal products. . . . Operates on

either natural gas, manufactured gas, or other low temperature
fuel gas and compressed air. Stands up under rough shop use.
. . . Send for literature.

WELDIT ACETYLENE CO.

641 BAGLEY AVENUE • DETROIT 26, MICH.

PRICES

Ferromanganese

78-82% Mn, maximum contract base
price per gross ton, lump size, f.o.b. car
at Baltimore, Bethlehem, Philadelphia,
New York, Birmingham, Rockdale, Rock-
wood, Tenn.
Carload lots (bulk) \$135.00
Carload lots (packed) 141.00
Less ton lots (packed) 148.50
\$1.70 for each 1% above 82% Mn;
penalty, \$1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of
metal, f.o.b. shipping point with freight
allowed. Spot sales add 2c. per lb.
96-98% Mn, .2% max. C, 1% max. Si;
2% max. Fe.
Carload, bulk 36c.
L.c.l. lots 38c.
95-97% Mn, .2% max. C, 1.5% max. Si,
2.5% max. Fe.
Carload, bulk 34c.
L.c.l. lots 35c.

Spiegeleisen

Maximum base, contract prices, per
gross ton, lump, f.o.b. Palmerton, Pa.
16-19% Mn 19-21% Mn
3% max. Si 3% max. Si
Carloads \$35.00 \$36.00
Less ton 47.50 48.50

Electric Ferrosilicon

OPA maximum base price cents per lb.
contained Si, lump size in carloads, f.o.b.
shipping point with freight allowed.

	Eastern	Central	Western
Zone	Zone	Zone	Zone
50% Si . . .	6.65c.	7.10c.	7.25c.
75% Si . . .	8.05c.	8.20c.	8.75c.
80-90% Si . .	8.90c.	9.05c.	9.55c.
90-95% Si . .	11.05c.	11.20c.	11.65c.

Spot sales add: 45c. per lb. for 50%
Si, .3c. per lb. for 75% Si, .25c. per lb.
for 80-90% and 90-95% Si.

Silvery Iron

(C/L, Per Gross Ton, base 6.00 to 6.50 Si)
F.o.b. Jackson, Ohio \$29.50*
Buffalo 30.75*

For each additional 0.50% silicon add
\$1 a ton. For each 0.50% manganese
over 1% add 50c. a ton. Add \$1 a ton
for 0.75% phosphorus or over.

*OPA price established 6-24-41.

Bessemer Ferrosilicon

Prices are \$1 a ton above silvery iron
quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of
contained Si, lump size, f.o.b. shipping
point with freight allowed to destination,
for L.c.l. above 2000 lb., packed. Add .25c.
for spot sales.

	Eastern	Central	Western
Zone	Zone	Zone	Zone
96% Si, 2% Fe. 13.10c.	13.55c.	16.50c.	
97% Si, 1% Fe. 13.45c.	13.90c.	16.80c.	

Ferrosilicon Briquets

OPA maximum base price per lb. of
briquet, bulk, f.o.b. shipping point with
freight allowed to destination. Approx-
imately 40% Si. Add .25c. for spot sales.

	Eastern	Central	Western
Zone	Zone	Zone	Zone
Carload, bulk. 3.35c.	3.50c.	3.65c.	
2000 lb. car- load	3.8c.	4.2c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of
metal, f.o.b. shipping point with freight
allowed. Add .25c. for spot sales. 65-70%
Mn, 17-20% Si, 1.5% max. C.

	Eastern	Central	Western
Zone	Zone	Zone	Zone
Carload, bulk	6.05c.		
2000 lb. to carload	6.70c.		
Under 2000 lb.	6.90c.		
Briquets, contract, basis carlots, bulk freight allowed, per lb. . . .	5.80c.		
2000 lb. to carload	6.30c.		
Less ton lots	6.55c.		

Ferrochrome

(65-72% Cr, 2% max. Si)

OPA maximum base contract prices per
lb. of contained Cr, lump size in carload
lots, f.o.b. shipping point, freight allowed
to destination. Add .25c. per lb. con-
tained Cr for spot sales.

	Eastern	Central	Western
Zone	Zone	Zone	Zone
0.06% C	23.00c.	23.40c.	24.00c.
0.10% C	22.50c.	22.90c.	23.50c.
0.15% C	22.00c.	22.40c.	23.00c.
0.20% C	21.50c.	21.90c.	22.50c.
0.50% C	21.00c.	21.40c.	22.00c.
1.00% C	20.50c.	20.90c.	21.50c.
2.00% C	19.50c.	19.90c.	21.00c.
66-71% Cr, 4-10% C	13.00c.	13.40c.	14.00c.
62-66% Cr, 5-7% C	13.50c.	13.90c.	14.50c.

PRICES

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2c. per lb. to regular low-carbon ferrochrome price schedule. Add 2c. for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5c. per lb. to regular high-carbon ferrochrome price schedule.

Low-Carbon Ferromanganese

Contract prices per lb. of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, Eastern Zone. Add 0.25c. for spot sales.

	Carloads, Ton	Bulk, Ton	Less Ton
10% max. C, 1			
or 2% max. Si	23.00c.	23.40c.	23.65c.
15% max. C, 1			
or 2% max. Si	22.00c.	22.40c.	22.65c.
20% max. C, 1			
or 2% max. Si	21.00c.	21.40c.	21.65c.
25% max. C, 1			
or 2% max. Si	20.00c.	20.40c.	20.65c.
30% max. C, 1			
or 2% max. Si	16.00c.	16.40c.	16.65c.

Ferrochrome Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60 per cent contained chromium. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	8.25c.	8.55c.	8.95c.
Ton lots	8.75c.	9.25c.	10.75c.
Less ton lots	9.00c.	9.50c.	11.00c.

Ferromanganese Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66 per cent contained manganese. Add 0.25c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
Carload, bulk	6.05c.	6.30c.	6.50c.
Carload, bulk	6.05c.	6.30c.	6.60c.
Ton lots	6.65c.	7.55c.	8.55c.
Less ton lots	6.80c.	7.80c.	8.80c.

Calcium-Manganese-Silicon

Contract prices per lb. of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
16-20% Ca, 14-18% Mn, 53-59% Si			
Add 0.25c. for spot sales.			
Carloads	15.50c.	16.00c.	18.05c.
Ton lots	16.50c.	17.35c.	19.10c.
Less ton lots	17.00c.	17.85c.	19.60c.

Calcium Metal

Eastern zone contract prices per lb. of metal, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. Add 0.9c. for Central Zone; 0.49c. for Western Zone.

	Cast	Turnings	Distilled
Ton lots	\$1.80	\$2.80	\$5.00
Less ton lots	2.30	2.80	5.75

Chromium-Copper

Contract price per lb. of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi River. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 2c. for spot sales.

Shot or ingot 45c.

Ferroboron

Contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

	Eastern Zone	Central Zone	Western Zone
Ton lots	\$1.20	\$1.2075	\$1.229
Less ton lots	1.30	1.3075	1.329

Manganese-Boron

Contract prices per lb. of alloy, f.o.b. shipping point, freight charges allowed. Add 5c. for spot sales.

	Eastern Zone	Central Zone	Western Zone
75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C			
Ton lots	\$1.89	\$1.903	\$1.935
Less ton lots	2.01	2.023	2.055

Nickel-Boron

Spot and contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination.

	Eastern Zone	Central Zone	Western Zone
15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni			
11,200 lb.			
or more	\$1.90	\$1.9125	\$1.9445
Ton lots	2.00	2.09125	2.0445
Less ton lots	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, Standard grade, lump or 1/4" down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten, 10,000 lb. or more. \$1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va. \$2.70

Open hearth 2.80
Crucible 2.90
Primors

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal. \$1.50

Vanadium pentoxide, 88%-92% V₂O₅ technical grade, contract basis, any quantity, per lb. contained V₂O₅. Spot sales add 5c. per lb. contained V₂O₅. \$1.10

Silicaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval)

Carload lots 25c.
2000 lb. to carload. 26c.

Silvaz No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval)

Carload lots 58c.
2000 lb. to carload. 59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis

No. 1 87.5c.
No. 6 60c.
No. 79 45c.

Bortram, f.o.b. Niagara Falls
Ton lots, per lb. 45c.
Less ton lots, per lb. 50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb. \$2.25
2000 lb. lots. \$2.30

Under 2000 lb. lots. \$2.30

Ferrotitanium, 40%-45%, 0.10%C. max. f.o.b. Niagara Falls, N. Y., ton lots, per lb. contained Ti. \$1.23
Less ton lots \$1.25

Ferrotitanium, 20%-25%, 0.10%C. max., ton lots, per lb. contained titanium \$1.35
Less ton lots \$1.40

High-carbon ferrotitanium, 15%-20%, 6%-8% carbon, contract basis, f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload. \$142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with \$3 unitage freight equalled with Rockdale, Tenn., per gross ton. \$58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., \$3 unitage freight equalized with Nashville, per gross ton \$75.00

Ferromolybdenum, 55-75%, f.o.b. Langeloth, Washington, Pa., any quantity, per lb. contained Mo. 95c.

Calcium molybdate, 40%-45%, f.o.b. Langeloth and Washington, Pa., any quantity, per lb. contained Mo. 80c.

Molybdenum oxide briquettes, 48-52% Mo, f.o.b. Langeloth, Pa., per lb. contained Mo. 80c.

Molybdenum oxide, in cans, f.o.b. Langeloth and Washington, Pa., per lb. contained Mo. 80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add 1/4c. for spot sales. Carload lots 14c.

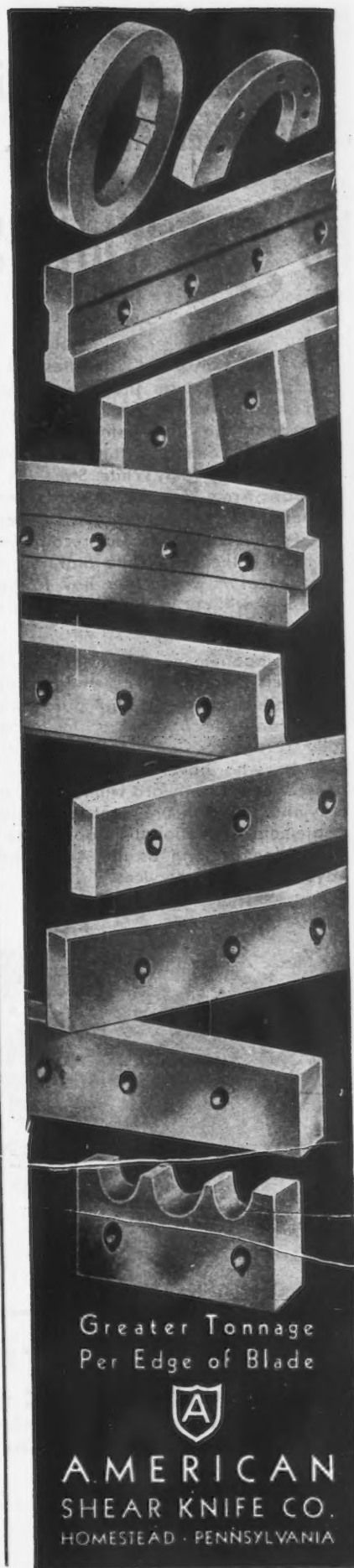
Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy

Carload, bulk 4.6c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk 5.75c.
Ton lots 7.25c.

Simanal (approx. 20% Si, 20% Mn, 20% Al), contract basis, f.o.b. Philo, Ohio, with freight not to exceed St. Louis rate allowed, per lb.

Car lots 8.00c.
Ton lots 8.75c.
Less ton lots 9.25c.



Greater Tonnage
Per Edge of Blade

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SHEAR KNIFE CO.
HOMESTEAD - PENNSYLVANIA

America's Most Significant Production Award

the 5th White Star comes to National Forge

A "five star plant" denotes the highest possible recognition that can be earned in war material production. And like military precedent, the 5th White Star can only be earned by "coming up through the ranks"—the preceding four White Stars, as well as the basic Army-Navy "E" Awards, have to be a matter of record before a company is in line for the 5th White Star recognition. And to receive the 5th White Star, the original excellence of production has to be maintained — without interruption — for six, successive, six month periods.

The management of National Forge therefore feels it can announce the receipt of the 5th White Star award with pardonable and understandable pride . . . a pride which fully recognizes that it is National Forge workers who have established this unsurpassed record as award winners . . . and also a symbol, we are sure, that there will be no abatement of National Forge efforts in war production as long as the Army and Navy have need of our services.



✦ The Record of Awards ✦

Navy Ordnance "E," October 24, 1941
All-Navy "E," April 24, 1942
First White Star, April 24, 1942
Army-Navy "E," October 24, 1942

Second White Star, October 24, 1942
Third White Star, April 24, 1943
Fourth White Star, October 24, 1943
Fifth White Star, October 24, 1944

NATIONAL FORGE & ORDNANCE CO.

IRVINE, WARREN COUNTY, PENNA.
"WE MAKE OUR OWN STEEL"

For Excellence  in Production

